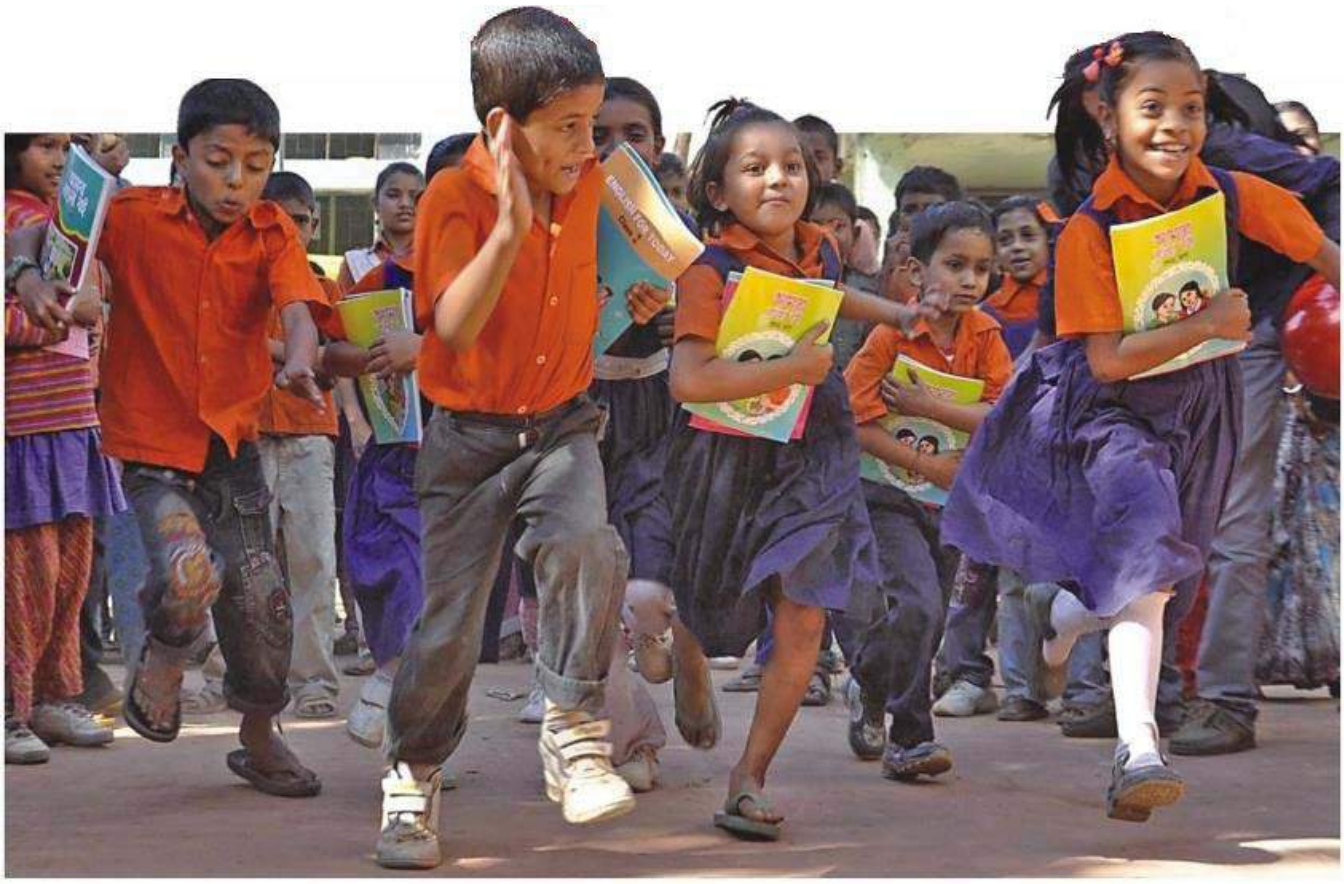
National Student Assessment 2013
for Grades 3 and 5



Monitoring & Evaluation Division
Directorate of Primary Education
Ministry of Primary & Mass Education

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Acknowledgement

I am immensely delighted to know that the Monitoring & Evaluation Division of Directorate of Primary Education has published the report of National Students Assessment (NSA) 2013. The main objectives of the NSA are to assess the levels of learning achievement of the students of Bangla and Mathematics for grade 3 and grade 5. I believe it gives a true picture of the leaning performance of the children. The current NSA report is significantly successful and the content of the report reflect the aims and objectives. This report is a real diagnosis of Primary Education and I hope it will help effective future planning for ensuring quality Primary Education in Bangladesh.

I would like to give thank to the Director (M & E) and concerned personnel of the division for managing and conducting such a robust study.

Here I also acknowledge the efforts to the colleagues of the National Assessment Cell (NAC) of DPE for administering the test nationwide and preparing this report under the professional guidance of Mr. Md. Mezaul Islam, Deputy Director of M & E Division.

My special thanks to the DPE officials of National, Divisional, District, Upazila and cluster levels for actively cooperating to conduct NSA-2013 in various ways.

Australian Council for Educational Research (ACER) provided the necessary technical support to carry out all related analysis of data and preparing the report. ACER's valuable contribution and cooperation is highly appreciated.

I also extended my deep appreciations and sincere thanks to the Head teachers, Assistant teachers of the sampled GPS and RNGPS, Supervisors, Invigilators for their help of administering the tests. .

Primary curriculum wing (PCW) of National Curriculum and Textbook Board (NCTB) extended its active support for developing test items and piloting them. I appreciate their remarkable contribution.

Finally, I would like to convey my special thanks to the World Bank for their active and continuous support which contributes a lot for the preparation of the report. I also give thanks to Ms. Ayesha Vawda, and Syed Rashed AL Zayed (Josh) and other members of concern working groups for their active support and advice in conducting the NSA. I also recognize the contributions of other Development Partners (DPs) and thank them all.

18.12.2014

Mohammad ALamgir
Director General
Directorate of Primary Education

Acronyms

ACER	:	Australian Council *for* Educational Research
ADSL	:	Associates for Development Services Limited
AUEO	:	Assistant Upazila Education Officer
BSS	:	Bangla Scale Score
CRQ	:	Constructive Response Question
C-in-Ed	:	Certificate in Education
DPs	:	Development Partners
DPE	:	Directorate of Primary Education
DPEO	:	District Primary Education Officer
EFA	:	Education for All
GOB	:	Government of Bangladesh
GPS	:	Government Primary School
H.S.C.	:	Higher Secondary Certificate
IRT	:	Item Response Theory
JSC	:	Junior School Certificate
KG	:	Kinder Garten
KPI	:	Key Performance Indicator
LO	:	Learning Outcome
LOC	:	Learning Outcome Category
MCQ	:	Multiple Choice Question
MDG	:	Millennium Development Goal
MLA	:	Monitoring Learning Achievement
MSQ	:	Mean Square
MoPME	:	Ministry of Primary and Mass Education
MSS	:	Mathematics Scale Score
NSA	:	National Student Assessment
NAC	:	National Assessment Cell
NAPE	:	National Academy for Primary Education
NCTB	:	National Curriculum and Textbook Board
NGO	:	Non Government Organization
PEDP II	:	Second Primary Education Development Program
PISA	:	Program for International Student Assessment
PPS	:	Probability Proportional to Size
PIRLS	:	Progress in International Reading Literacy Study
PTI	:	Primary Teachers' Training Institute
RNGPS	:	Registered Non–Government Primary Schools
S.S.C.	:	Secondary School Certificate
SD	:	Standard Deviation
SMC	:	School Management Committee
SSQ	:	Short Structured Question
TIMSS	:	Trend International Mathematics and Science Survey
UEO	:	Upazila Education Officer
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
UNICEF	:	United Nations International Children's Emergency Fund
URC	:	Upazila Resource Centre

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Executive Summary

A nationally representative samples of 22871 Grade 3 and 17828 Grade 5 pupils from 7 types of primary schools from all Divisions participated in 2013 National Student Assessment in Bangla and Mathematics. At each grade pupils responded to questions designed to measure what they know and can do across the two subjects.

Introduction

The Bangladesh Primary Education system is large, catering to over 22 million pupils. In the last decade it made great strides in improving access to education however quality remains a challenge. The National Student Assessment (NSA) programme is a continuation of the Ministry of Primary and Mass Education (MoPME) initiative to evaluate the outcomes of primary education in Bangladesh and draw implications for improvements in teaching and learning. A key function of this large scale national assessment programme is to provide data to inform policy and plan educational reforms to improve student achievement.

NSA was first initiated in 2006 however it is only since the 2011 cycle that processes have been used that allow valid comparisons to be made between years of testing. The data from 2011 is therefore considered as a valid baseline; for monitoring future educational improvements over time. As a monitoring programme the NSA provides an independent and objective data source that informs stakeholders on the current performance of the pupils in each subject area assessed in NSA.

Objectives

The objectives of this current National Student Assessment are as follows:

i. To assess the levels of learning achievement of the pupils of Grade3 and 5 in learning outcomes of specified subjects.
ii. To identify the status of key school factors relating to pupil learning achievement
iii. To identify the important school factors influencing pupil learning achievement
iv. To compare the school factors of best achieving schools with those of poorly achieving schools
v. To recommend policy action for improving the quality of primary education and levels of pupil achievement

Methodology

The data needed to address the objectives of the study were gathered by administering tests to a sample of pupils and a pre-designed 'School Data Form' to the Head Teachers and teachers of sample schools. The sample included 22871 students in Class 3 and 17828 students in Class 5 in 1035 schools. The sample covered 64 Upazilas from 32 Districts under 7 administrative Divisions.

Tests in two subjects (Bangla and Mathematics) were conducted for Grade 3 and 5 pupils. Each test consisted of two parts with different item types such as Multiple Choice Questions (MCQs) and Short Structured Questions (SSQs). All test instruments were developed by panels of specialists under the supervision of Directorate of Primary Education (DPE) and National Curriculum and Textbook Board (NCTB). The 'Socio-economic and Teachers' Data Form' were developed by the National Assessment Cell (NAC) team of DPE under the guidance of the national consultant of World Bank.

Key Findings:

Highlights of National Performance

- There is little change in the performance of Grades 3 and 5 pupils in either Bangla or Mathematics since 2011. This minimal change in student performance over the past two years is reflective of the time it takes to see improvements in student learning as a result of **structural, curricular and instructional reforms.** Grade5 achievement was significantly higher than Grade 3 in 2013 and indicates a strong learning growth for both subjects. This is consistent from last year and indicates sustained and consistent growth.

- Gender differences are negligible and indicative of the equity achieved by the Bangladesh education system. This is consistent across the grades, and subjects between assessment cycles.

- In both grades, rural pupils performed slightly better than their urban counterparts in mathematics only.

- The rank order of the highest achieving districts has changed since 2011. Barisal and Rajshahi are high performers while Sylhet remains the lowest for both subjects in both grades.

- Government Primary Schools (GPS) overall performance is higher from all other types of primary schools and this again is consistent from 2011. However, further school effectiveness studies need to be undertaken to analyse the between school variation.

- NSA 2013 found large between school variations, 72 percent for Bangla was between schools and 28 per cent within school. Similarly for mathematics, 76 per cent variation was found between schools and 24 per cent variation was within the school. Further investigation needs to be undertaken to identify the reasons.

- The validity and reliability of tests have been found to be acceptable.

Performance by Subjects

Performance of students have been reported as achievement Levels (Band). Band is the reference indicator of student's level of proficiency in a subject and helps to understand the present and future performance of the students. Band 1 is considered as the basic level of proficiency while Band 5 is considered the highest skill level.

Bangla

- Mean performance of pupils at Grade 3 was 104 and 115 for Grade 5. It can be inferred that there is strong learning growth observed between the two grades.
- Eight per cent (8%) of Grade 3 and a 25 per cent (25%) of Grade 5 pupils demonstrated Band 5 reading achievement. Pupils at this level are beginning to infer meaning from short, challenging texts like poems, showing understanding of figurative language and detailed knowledge of rules of punctuation. They are also likely to have acquired the skills of all the lower bands.
- Fifty Two percent (52%) of Grade 5 pupils achieved at band 4, demonstrating the capacity to identify main ideas, make simple inferences etc. They are also likely to have acquired the skills of all the lower bands.
- Nearly 40 per cent (40%) of Grade 3 pupils score within Band 3 and these pupils are likely to have the skills to use simple clues to make inferences, show knowledge of word formation, identify simple word meanings and have likely acquired the skills of bands 1 and 2.
- Nearly 23% of Grade 3 pupils performed at band levels 1 and 2. Very few, i.e. 3% of Grade 5 pupils performed at band 2 level. Students at band 1 and 2 levels were able to understand, locate and interpret information in simple texts and recognise correct use of punctuation.

Mathematics

- Mean performance of Grade 3 pupils was 103 and 115 for Grade 5. This indicates a strong learning growth between grades.
- About 4 per cent (4%) of Grade 3 and 25 per cent (25%) of Grade 5 pupils scored at band 5 level, demonstrating well developed understanding of mathematical content and having the ability to apply strategies to solve word problems. They are also likely to have acquired the skills of the lower bands.
- A fifth (20%) of Grade 3 and over a third (34%) of Grade 5 pupils scored within band 4. The pupils at this level are more likely able to solve word problems, set up mathematical expressions and apply mathematical processes. They are also likely to solve problems based on perimeter, area and distinguish properties of 2D objects.
- Nearly 43% of Grade3 pupils and only 11% of Grade5 pupils have acquired simple arithmetic skills, are able to demonstrate some measurement skills and are working at band 1 and 2.

Performance between years

- There is no significant change in overall pupil performance between successive years.

- Bangla Grade 3 student achievement was on average a little higher in NSA 2013 than in NSA 2011, however this difference was moderate. Bangla Grade 5 student achievement was similar from NSA 2011 to 2013.
- Mathematics Grade 3 Mean performance was a little higher in NSA 2013 than in NSA 2011, however this difference was small. Mathematics Grade 5 mean performance was a little higher in NSA 2011 than in NSA 2013. This difference was also small.
- Mean performances by division in Grade 3 shows a significant difference for Barisal, Rajshahi and Rangpur. Dhaka, which had the highest mean in 2011, remained consistent at 102 in 2013. Further investigation will be useful to identify the reasons for significant improvements in some divisions.

Limitations

The administration of test in whole country was not at all smooth for DPE. Many adversities and hazards came in the way of test administration and the steps that followed.

Bangladesh runs one of the largest primary education systems in the world with 107 thousand schools. Due to various problems it was not possible to cover all types of schools in the sample.

All personnel related to the field test administering in the whole country were not adequately trained up. Also the schools and the students were not familiar with such type of test items.

The Primary curriculum was revised and implemented in 2013. But the new curriculum was not disseminated to the teachers. In the revised curriculum some content are shifted from grade V to grade IV. So the students who were grade IV in 2012 and promoted to grade V in 2013 did not get the opportunity to read the shifted contents.

Concluding Comments and way forward

The NSA is established as a highly sophisticated monitoring and evaluation programme. It is imperative that the data from NSA is used as an integrated part of policy-making, providing the evidence-base for setting national standards, and development of a clearly articulated plan for educational reform which has improvement of student learning as its main goal.

To establish a robust cycle of data collection, policy development and policy evaluation, the Ministry should continue to support the NSA by providing the resources to maintain and strengthen the capacity of NAC at DPE and PCW at NCTB to administer a world–class monitoring programme.

Creating an Institutional System

- National assessments are ongoing programmes and therefore it is very important that a multi-disciplinary team is trained to lead the programme. The following personnel should be selected and trained for all future cycles of the NSA: teams of subject experts with interest in, and talent for item development; a project manager to lead field work and organise quality assurance in all processes; data managers to manage databases and analyses.

- It is recommended that DPE and NCTB strengthen quality assurance processes relating to test administration, test marking and data entry to ensure consistent and fair operation of the programme across the country.

- It is recommended that if the main study is to be conducted at the end of the academic year in December then the trial of the test should also be conducted in December of the year before. This recommendation arises from the trials for both 2011 and 2013 conducted in June-July (mid-year of schooling) providing significantly different estimates of item difficulty from those in the main study.

Expansion of NSA

Detailed diagnostic information for teachers helps to improve classroom teaching and achievement. Reporting by sub-scales can provide more detailed information to the stakeholders of the strengths and weaknesses of students. The current assessment framework and test design allows assessing the core topics of the subject, however it is recommended that the programme is expanded to include further sub-scale development in the next cycle. It is also recommended that writing be assessed and reported separately from reading. Writing is an important aspect of language development and learning and since some aspects of writing were included in 2011 it is recommended that writing be included in the next cycle of NSA.

Dissemination of NSA Results

Dissemination of NSA findings and their relevance for classroom practice, school planning, and national education policy is recommended. Workshops should be organized in all districts that provide simplified and straight forward explanations to teachers of the findings and how NSA information can be used to improve student learning.

Chapter 1

Introduction

1.1 Background

Bangladesh Government has placed high priority on education, particularly at the primary school level for human resource development. The country runs one of the largest primary education system in the world, with around 22 million primary school age pupils, 466 thousand teachers and about 107 thousand schools. For administrative purposes the country is divided into 7 Divisions, 64 Districts and 505 Upazilas (including Thanas) and so is the structure of primary education management.

Bangladesh has a primary education course of five years, with grades 1 to 5 and additional 1 year for pre-primary education. The entry age in Pre-Primary is 5 years and for Grade 1 it is 6 years. With a view to improving the quality of education a competency-based curriculum, developed by NCTB, has been implemented in the primary schools. The primary school curriculum consists of 9 subjects: (i) Bangla, (ii) Mathematics, (iii) English, (iv) Science, (v) Bangladesh and Global Studies (vi) Religious and Moral Education (one from 4 religions: Islam, Hinduism, Buddhism and Christianity), (vii) Arts and Crafts, (viii) Physical Education and (ix) Music.

As a result of the multi-dimensional interventions implemented during the past two decades Bangladesh has seen a remarkable progress with regard to the quantitative development particularly in enrolment and gender parity of primary education.

A major shortcoming in the Bangladesh education system is that the *quality of primary education* which is not at a satisfactory level. It has been revealed from studies that many of the children do not attain the learning standards set through the competency-based curriculum. There is also evidence to the effect that many pupils who complete primary education do not attain the acceptable standards of literacy and numeracy.

Many factors seem to contribute to this real and perceived lack of quality education. Among them the following are considered as outstanding: weak organizational and institutional framework for delivery of primary education, lack of proper physical environment at schools, the shift or staggered system with its comparatively short school contact hours, lack of support materials, and inadequate number of trained teachers, traditional classroom teaching and learning practices .

According to these assessments it is evident that Bangladesh has a challenging task to perform in order to reach the EFA goals by 2015.

Bangladesh is committed to the Millennium Development Goals (MDGs) adopted in 2000 at the Millennium Summit of world leaders held at the United Nations Headquarter. The overarching aim of MDG is to eradicate extreme poverty and improve the welfare of the people by the year 2015. Of the eight MDGs, two have a special education focus. These are: Goal 2 – Achieve universal primary education and Goal 3 - Promote gender equity and empower women. As noted above, Bangladesh has done well in respect of the gender parity goal at primary education, at least in terms of

enrolment. Achieving universal primary education, and gender parity at all levels and in all aspects of participation and quality in education are however tougher challenges ahead.

To measure the quality of primary education and pupil learning outcomes in cognitive and other skills, the DPE decided to conduct a series of National Assessments of Learning Achievement of primary pupils. During PEDP II two rounds of NSA were conducted in 2006 and 2008. In PEDP3 1st round of NSA was conducted in 2011 and this study was conducted in 2013 as the second round.

1.2 National Student Assessment (NSA) Programme

Improving the educational performance of the students of Bangladesh is critical for its growth and economic progress. Quality education provides students the opportunity to acquire skills that they need to participate productively in the growth of a country.

As a major initiative in 2011 the Government of Bangladesh launched a revised National Student Assessment (NSA) based on modern test theory, specifically Item Response Theory. Baseline data were collected; national levels of achievement in key subject areas (Bangla and mathematics) were measured, and comparisons of achievement of key subgroups (such as boys and girls, rural and urban) were made. The objectives of the initiative were to:

- provide the government and other stakeholders (teachers and parents) with valuable planning information about the general conditions of schooling and the quality of education
- provide valid and reliable empirical evidence to the Ministry regarding standards of student achievement over time
- provide an evidence base for allocation of resources and policy development.

The National Student Assessment programme has been established with the aim of seeking answers to the following questions:

- How well are the students learning in the system?
- Is there evidence of strengths and weaknesses in areas of students' knowledge and skills?
- How are sub-groups performing in the system?
- What factors are associated with student achievement?
- Does the achievement of students change over time?

The sample included 22,869 students of grade3 and 17,828 pupils of grade 5 from 1035 schools nationwide from 7 types of primary level institutions. The sample was covered 64 upazilas and 32 districts under 7 administrative divisions.

Test instruments were developed by panels of specialists under the supervision of DPE and NCTB for Bangla and Mathematics.

1.3 Public Examination

The public examinations, that are conducted annually at Class 5 (Primary Education Completion Examination), Class 8 (Junior School Certificate–JSC), Class 10 (Secondary School Certificate–SSC), and Class 12 (Higher Secondary Certificate–HSC) through which students wish to receive a certificate of completing a level that are expected.

Examination plays a vital role in determining approaches to teaching and learning and those teachers face great pressures from various stakeholders to gear their teaching to prepare students for passing examinations with good grades. Students are also expected by teachers and parents to sharpen their latent potentials in rote memorizing factual knowledge and reproducing it in the examination. There is little emphasis on testing children's understanding of what they learn and on higher order skills. Public examinations are conducted in many countries of the world and have been considered to play a significant role in determining what goes on in the classroom in terms of 'what' and 'how' teachers teach and students learn, and can have an impact on both teaching and learning.

The purpose of public examinations conducted is clearly that of promotion, selection and certification and indicates the extent to which learners have covered a prescribed syllabus. For stakeholders at schools it is to pass them with good grades and to bring good name to school. For some schools, teachers and students, passing examination with highest positions become a question of prestige and yet some other may want to get through them by any means. These examinations are sole determinants of students' future career in pursuing further or higher education or getting into the job market.

The present system of examination is based on summative examination system that drives the curriculum rather than assesses achievement. It is mostly based on assessing factual knowledge rather than students' critical thinking and analytical skills as well as their understanding and comprehension. Thus teachers teach for testing, rather than for learning. The examination system reinforces approaches to teaching that reward memorization. The better their production, the better and higher scores or marks awarded by the examiners. There are grave issues in the examination system from paper setting, invigilation, paper marking and tabulation to dissemination of results.

Teachers and students mostly rely on one prescribed textbook for each subject. Examination questions are repeated at least every three to five years and hence questions can be predicted. There are 'model papers', or 'guess paper guides' available in the market with readymade answers based on past five years papers. Teachers and students tend to rely on such guides and put their content to memory. Rote memorization seems to be the only key for students to pass the examination rather than creative thinking and independent analyses. The irony is that those students score higher marks who could reproduce better. This leads to lecture method and textbook based teaching approaches.

1.4 National Student Assessment (NSA)

The NSA is a learning assessment that is based on the national curriculum. It is different from public examinations by nature. The main objective of the study is to diagnose the health of the primary education system in Bangladesh by assessing the learning achievements of students. It also aims to examine how different factors, especially school inputs, student background, teacher quality may or may not be associated with higher learning achievements of students. A learning assessment study is usually conducted on a sample basis. It helps to determine the distribution of students' learning achievement and provide feedback to policy makers and other concerned stakeholders to improve the education system.

The NSA is developed specifically to measure competency of students in Bangladesh. Unlike international leaning assessment tests, such as TIMSS (Trends in International Mathematics and Science Studies) and PIRLS (Progress in International Reading Literacy Study), the NSA does not aim to compare learning levels of Bangladeshi students with students of other countries. It rather aims to measure the levels of competencies that students in Bangladesh acquire in Bangla and Mathematics as opposed to the expectations in the national curriculum. It also allows policy makers to understand what type of schools and students performs better in the education system and what type of support students, teachers and schools need to improve learning.

The NSA 2013 is the first follow up round since the NSA 2011, the baseline reference point for monitoring the progress of students' achievement. NSA 2013 can be analyzed in comparison with NSA 2011, but it can be still used by itself for understanding various background factors contributing to the students' learning and inequalities in performance across different groups. To capture various factors of learning, specific instruments were developed to collect information about students' household background, teachers, and schools in addition to students' test scores. These sets of information will help policy makers understand correlates to the distribution of learning achievements among different school types, students' background, or geographical areas.

The NSA 2013 also allows understanding various factors affecting students' learning. Students' learning is influenced by various factors, including schools, teachers, household and socio-economic background. To capture these factors, specific instruments are developed to collect information about students' household background, teachers, and schools in addition to students' test scores. These sets of information will help policy makers understand correlates to the distribution of learning achievements among different school types, students' background, or geographical areas.

Chapter 2

Objectives, Methodology and Limitations

2.1 Objectives

The major objective of the current national assessment is to assess the learning achievement of pupils of Grades 3 and 5 in the learning outcomes prescribed in the primary curriculum, with a view to feeding the findings to the primary education sub-sector programme to make further improvements in quality, especially in the primary level planning & management, and teacher education. More specifically the objectives of the study can be stated as follows:

vi. To assess the levels of learning achievement of the pupils of Grade3 and 5 in learning outcomes of specified subjects.
vii. To identify the status of key school factors relating to pupil learning achievement
viii. To identify the important school factors influencing pupil learning achievement
ix. To compare the school factors of best achieving schools with those of poorly achieving schools
x. To recommend policy action for improving the quality of primary education and levels of pupil achievement

It is envisaged that the application of national assessment results in the planning & management, and teacher education will bring about improvements in the curriculum, textbooks, other instructional materials, academic supervision and classroom teaching and learning. Further, the findings will be able to contribute to formulation of reforms in the primary education and improving the internal efficiency of the system.

Improving the educational performance of the students of Bangladesh is critical for its growth and economic progress. Quality education provides students the opportunity to acquire skills that they need to participate productively in the growth of a country.

As a major initiative in 2011 the Government of Bangladesh launched a revised National Student Assessment (NSA) based on modern test theory, specifically Item Response Theory. Baseline data were collected; national levels of achievement in key subject areas (Bangla and Mathematics) were measured, and comparisons of achievement of key sub-groups (such as boys and girls, rural and urban) were made. The objectives of the initiative were to:

- provide the government and other stakeholders (teachers and parents) with valuable planning information about the general conditions of schooling and the quality of education
- provide valid and reliable empirical evidence to the Ministry regarding standards of student achievement over time

- provide an evidence base for allocation of resources and policy development.

The National Student Assessment programme has been established with the aim of seeking answers to the following questions:

- How well are the students learning in the system?
- Is there evidence of strengths and weaknesses in areas of students' knowledge and skills?
- How are sub-groups performing in the system?
- What factors are associated with student achievement?
- Does the achievement of students change over time?

2.2 Methodology

The Bangladesh National Student Assessment is a bi-annual sample based assessment programme in Grade3 and 5 in Bangla and Mathematics. A representative, random sample of students is drawn to take part in the testing programme. Students from seven types of primary schools and both rural and urban backgrounds representing all divisions were chosen to participate in the assessment. NSA tests are equated so that the 2013 results can be validly compared with those of 2011 and trends in future years can be reported. NSA results are reported using two achievement scales – Reading and mathematics - and these scales make it possible to provide comparisons between grades and between years.

The data needed to address the objectives of the study were gathered by administering tests to a sample of pupils and a pre-designed 'School Data Form' to the Head Teachers and teachers of sample schools. The sample included 22871 students in Class 3 and 17828 students in Class 5 in 1035 schools. The sample covered 64 Upazilas from 32 Districts under 7 administrative Divisions.

Tests in two subjects (Bangla and Mathematics) were conducted for Grade 3 and 5 pupils. Each test consisted of two parts with different item types viz., Multiple Choice Questions (MCQs) and Short Structured Questions (SSQs). All test instruments were developed by panels of specialists under the supervision of Directorate of Primary Education (DPE) and National Curriculum and Textbook Board (NCTB). The 'Socio-economic and Teachers' Data Form' were developed by the NAC team by the guidance of the national consultant of World Bank. The validity and reliability of tests have been found to be acceptable.

Administration of tests and the 'Socio-economic and Teachers' Data Form' in the sample schools were carried out by trained personnel under the supervision of DPE Field Supervisors, in 9 November 2013. Evaluations of answer scripts and data entry were conducted by ADSL – a local consulting firm under the supervision of DPE and experts of World Bank. All the other related processes including data analysis were carried out by the ACER, paying special attention to ensuring quality throughout.

Data were analysed in depth to enable strata-wise differences in pupil achievement to be examined at national, divisional and district levels. Strata included gender (boys & girls), school location (urban & rural) and school type (GPS & RNGPS). Statistical analysis of test data focused mainly on IRT based

scale score for the analysis and it will not analyze students' performance based on raw score or percentage of correct answer. Based on scale score, 5 bands were created with different competency levels. Also statistical analysis of test data addressed measures of central tendency and dispersion and percentage distributions of pupils by levels of achievement. Correlation matrices were estimated and multiple regression models were constructed in order to examine the school related variables on achievement.

2.3 NSA Population, Sample and Sample Coverage

Most large scale, comprehensive and rigorous international testing programmes such as PISA, TIMSS and PIRLS use random sampling as a reliable method for sampling. The NSA too adopted the random sample method.[1]

The sample included 22871 pupils of grade 3 and 17828 pupils of grade 5 from 1035 schools nationwide. The sample was covered 64 upazilas and 32 districts under 7 administrative divisions. This is a nationally representative sample of class 3 and class 5 with representation of seven types of schools (Government Primary School [GPS], Registered Non-Government Primary School [RNGPS], High school attached Primary School, Kinder Garten [KG], Ebtedayee Madrasah, BRAC Centre, ROSC.) For the administrative reasons around 6649 schools from 5 types (NGPS, Experimental schools, NGO schools, community schools and *Shishu Kollan* schools) were not included in the sample as the number is small in comparison with total numbers of schools. This accounts nearly 7% of the total schools in Bangladesh. Region wise population coverage is displayed in the table below:

Table 1: Distribution of sample and target population by divisions

Division	No. of school (Pop)	No. of school sample	Total Enrolment (G3)	Proportionate (Pop)	Student Sample (G3)	Proportionate Sample	Total Enrolment (G5)	Proportionate (Pop)	Student Sample (G5)	Proportionate Sample
Barisal	6856	59	262801	7.0	1278	5.6	178591	7.2	1115	6.3
Chittagong	11692	212	714905	18.9	4962	21.7	498696	20.1	3919	22.0
Dhaka	16399	297	1024484	27.1	6883	30.1	684453	27.6	5145	28.9
Khulna	9040	111	390889	10.4	2430	10.6	268382	10.8	2038	11.4
Rajshahi	9513	122	640979	17.0	2782	12.2	402859	16.2	2171	12.2
Rangpur	9329	117	444443	11.8	2607	11.4	264339	10.7	2054	11.5
Sylhet	5818	83	296365	7.9	1929	8.4	184594	7.4	1386	7.8
Bangladesh	**68647**	**1001**	**3774866**	**100.0**	**22871**	**100.0**	**2481914**	**100.0**	**17828**	**100.0**

That number of students in each grade sampled from each division was more or less proportionate to the total enrolment for that grade in that division.

2.4 NSA Assessment Instruments

The NSA test items were developed by the National Curriculum and Textbook Board (NCTB), the apex body responsible for curriculum in Bangladesh, in consultation with the National Assessment Cell (NAC) from the Directorate of Primary Education. Subject committees were convened by NCTB

[1] Random samples are proven to be accurate, reliable, economical, practical and efficient

that included curriculum experts and practicing teachers. The committees were responsible for the development of test items for each subject in each grade. The content of the tests was determined by specifications provided in assessment framework for each subject that describe the specific knowledge and skills to be assessed.[2]

A key requirement of NSA 2013 tests was that they meet the expected requirement of the revised *Aims and Objectives of Primary Education* and also reflect higher level of cognitive skills. Therefore, in 2013 a variety of texts were included in the reading test. The texts whilst similar to those used in text books, but were not taken directly from them. Rather they built on questions that assessed knowledge of language, comprehension skills and interpretation skills. The mathematics test assessed basic mathematical skills and concepts in context, application of skills and concepts and critical thinking.

In both the Bangla and mathematics tests; multiple choice questions and short structure questions were included. PCW of NCTB and NAC of DPE classified all questions according to the cognitive domain and they addressed: knowledge, comprehension, application and higher order thinking skills.

2.5 Bangla Instruments

The Bangla tests assessed reading comprehension, vocabulary and grammar as defined by the curriculum. The fundamental skills of reading comprehension remain the same across grade levels. However, the difficulty of the texts used and the complexity of the task increased in the higher grade. Some texts and some questions were common to Grade 3 and 5. This enables comparison of the reading ability of students on the same scale across grade levels. A variety of texts were included that were appropriate text-types and dealt with contexts familiar to children at each grade. The texts were similar to those used in the text book, but were not taken from the text book. The assessment included three broad categories of texts such as Imaginative, Informative/descriptive and Argument/persuasive.

Imaginative texts: texts that involve the use of language to represent, recreate, shape and explore human experiences in real and imagined worlds. They include, for example, fables, short stories, novels, plays, poetry.
Informative/descriptive texts: texts that involve the use of language to represent ideas and information related to people, places, events, things, concepts and issues. They include, for example, reports, descriptions, biographies, explanations, news articles.
Argument/persuasive texts: texts that systematically present a point of view or seek to persuade an audience. They include, for example, formal essays, letters, advertisements, interviews and reviews.
Further, questions were also classified according to the cognitive domain they addressed: knowledge, comprehension, application.

Exhibit 1 Types of text in Bangla

The tests ensured coverage of an appropriate balance of content; various skills related to reading comprehension (including the ability to locate, identify, interpret, infer and synthesis information) as well as aspects of language use such as vocabulary and grammar were tested. The question-types

[2] The NCTB oversees the development of the NSA assessment frameworks in consultation with NAC. The frameworks prescribe curriculum balance and the range and type of test questions that are to be used.

were categorised by cognitive skills (knowledge, understanding, application and higher order thinking) in the three broad categories: comprehension, grammar and vocabulary.

The distribution of items based on the cognitive skills is provided below in table 2.

Table 2: Classification of Items by Categories & Skills – Bangla

Skills / Categories	Knowledge		Understanding		Application		Higher Order Thinking		Total number of questions	
	Grade 3	**Grade 5**	**Grade 3**	**Grade 5**	**Grade 3**	**Grade 5**	**Grade 3**	**Grade 5**	**Grade 3**	**Grade 5**
Reading Comprehension	9	10	6	12	3	3	6	5	24	30
Grammar	4	3	1	0	2	3	0	0	7	6
Vocabulary	2	0	2	4	0	0	0	0	4	4
TOTAL	***15***	***13***	***9***	***16***	***5***	***6***	***6***	***5***	***35***	***40***

2.6 Mathematics Instruments

The framework for Mathematics ensures an appropriate balance of content and allows assessment for a variety of ways of knowing and doing mathematics. The mathematics instrument covered the content and cognitive domains and have questions that vary in difficulty from ones that test basic skills (identifying the numeral from the expanded form, familiar shapes, unit conversion in mass, using the scale to measure capacity, comparing numbers, etc) to questions that required reasonably advanced skills (finding averages in real life context and from data, operations of addition and subtraction of fractions, using decimals in money transactions to calculating area and perimeter of rectangle and triangle) for students in primary grades. Four key areas of mathematical content were measured and each question in the test assessed at least one of these areas such as Number & operations, Measurement & units of Measurement, Shape & space and Data.

Number and operations: It measures students' understanding of ways to represent, calculate and estimate numbers use them in real life context. The topics in this strand include:
- Counting, place value, comparing, ordering, number operations (whole numbers, fractions and decimals), simplifying expressions, applications of operations, properties of numbers (even and odd numbers), factors and multiples, HCF and LCM of whole numbers, percentages and unitary method

Measurement and units of Measurement: This measures students' understanding of different concepts of measurement to using them in real life context. The topics in this strand include:
- Time (reading time, representing in different formats, conversion, addition and subtraction)
- Length, mass and capacity (representation using decimals, unit conversion, operations in unitary method and in other areas)

Shape and space: Shape and Space measures students' understanding of geometrical shapes. The topics in this strand include:
- Identification of shapes, knowledge of properties of certain shape, applying properties to solve problems

Data: Data applicable for Grade 5 only measures students' understanding of handling information around them and presenting it. The topics in this strand include:

- Reading simple graph, representation of data

Questions were also classified according to the cognitive domain that addressed:

knowledge, understanding, application and higher order thinking skills.

Table 3: Classification of Items by Categories & Skills – Mathematics

Skills / Categories	Knowledge		Understanding		Application		Higher Order Thinking Skill		Total Number of Questions	
	Grade 3	**Grade 5**	**Grade 3**	**Grade 5**	**Grade 3**	**Grade 5**	**Grade 3**	**Grade 5**	**Grade 3**	**Grade 5**
Number	4	8	7	5	6	6	3	2	20	21
Measurement	4	2	3	3	2	3	1	1	10	9
Data	-	1	-	2	-	-	-	1	0	4
Shape & Space	3	2	1	3	1	-	-	1	5	6
TOTAL	***11***	***13***	***11***	***13***	***9***	***9***	***4***	***5***	***35***	***40***

2.7 Test Administration and Monitoring

The testing for both the grades was administered in a day and that was 9 November 2013 prior to the school annual Examination. The total time allocated for each test was 60 minutes. The tests were invigilated by trained supervisors to ensure high levels of consistency of administration across the country. NAC was responsible for all aspects of administration and marking of the NSA. Pupils selected in the sample at each grade level were expected to sit for both Bangla and mathematics tests. Further, quality monitors visited some selected schools to ensure fair conduction of the survey. To ensure consistency of marking, constructed response questions were marked by specially recruited trained marker followed by NCTB and ACER developed marking guide.

2.8 Data Analysis and Understanding of Results

Raw test scores are only relevant to the actual test administered and cannot be used for future comparisons. Scale scores were developed using Item Response Theory (IRT) so that it is possible to validly compare learning assessments across the grades and over the years.

Scale score is the mathematical transformation of individuals' raw scores in order to report each test taker's score on a continuum consistently over the years and across different version of tests. The scale score provides a comparable metric, across all the tests within a subject. The IRT analyses allow for test difficulty and student ability to be reported independently on the same scale. In addition, a scale score of 100 will mean the same in 2013 as it did in 2011.

Exhibit 2

IRT, also known as Modern Test Theory, is a paradigm for the design, analysis, and scoring of test. It is generally regarded as superior to Classical Test Theory because it allows for measurement overtime and provides substantive information about skill and knowledge development. The Rasch

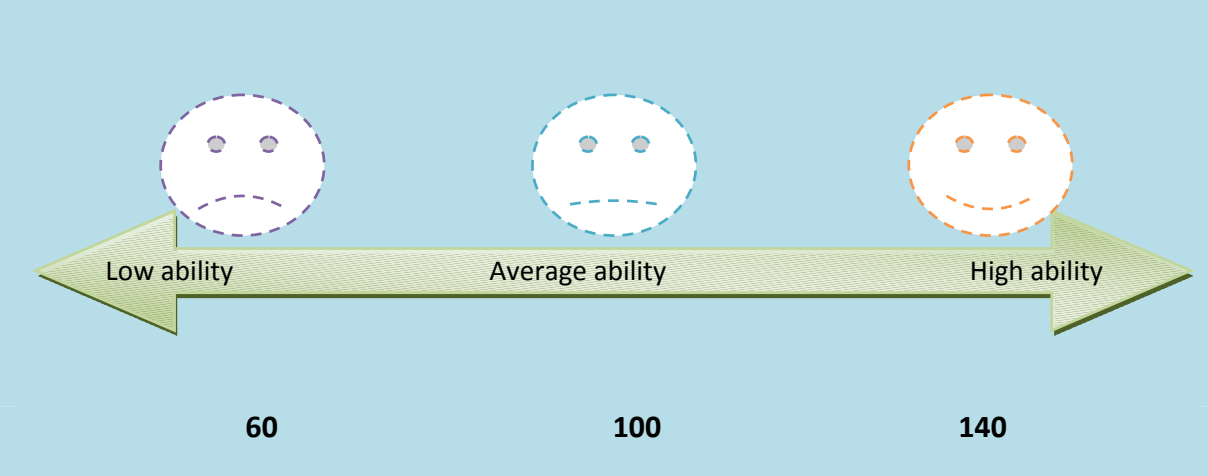
measurement model, a type of IRT, was used in the analyses for this testing programme using ACER's ConQuest software.

Rasch measurement is a probabilistic model which based on the probability of a correct response is a function of the difference between the ability of the person and the difficulty of the item. Rasch measurement helps to transform raw score which is essentially a rank order (ordinal scale) to scale score (interval scale) if the data fits to the model.

Exhibit 3

Through the IRT analysis, individual measurement scales for the two subjects were developed in 2011. The assessment programme conducted in 2011 is considered as baseline for NSA and all future comparison will be made on the basis of the scales developed for the 2011 cycle. These scales have been designated the Bangla Scale (BS) and the Mathematics Scale (MS). Both the achievement scales were set to have a mean of 100 and standard deviation of 10.

Figure 4: Scale Score



Using this method; any future scale score mean of above or below 100 and any future standard deviations of above or below 10 will indicate an increase or a decrease in the mean and standard deviation, relative to the 2011 NSA programme. For monitoring and research purposes over time, tests on each subject area administered in different years can be equated using Item Response modeling techniques and all current and future comparisons between grades and sub groups can therefore be made in the scale score metric.

It must be noted that the two subjects have been analysed separately and have different constructs and it is not valid to compare the scores across subjects.

The Rasch model of IRT analysis not only produces measurement scales so that scores overtime and between grades can be compared, the analysis provides two other key pieces of information:

- A continuum of skills and understandings, for the subjects, based on the test questions in order of increasing difficulty
- An estimate of students' skill in the subject based on their performance in the test.

On the scales that have been constructed through the analysis, the questions are located in the scale based on difficulty and students are located on the same scale based on their ability. This analysis

allows description of students' achievement in terms of the skills and understandings demonstrated. The displays are provided on page 23 (Bangla) and page 43 (Mathematics).

2.9 Limitations

Conducting this National Assessment study was an enormous task as it involved large sample of pupils, teachers, schools, upazilas and teams of administering personnel. The administration of test in whole country was not at all smooth for DPE. Many adversities and hazards came in the way of test administration and the steps that followed.

Bangladesh runs one of the largest primary education systems in the world with 107 thousand schools. Due to various problems it was not possible to cover all types of schools in the sample.

All personnel related to the field test administering in the whole country were not adequately trained up. Also the schools and the students were not familiar with such type of test items.

A list of item-wise learning outcomes of 2 subjects for each Grade 3 and 5 was supplied by DPE for carrying out the necessary analyses. After thorough analysis of the supplied lists, the consultants identified some discrepancies in stating proper learning outcomes for some of the items in some subjects.

The Primary curriculum was revised and implemented in 2013. But the new curriculum was not disseminated to the teachers. In the revised curriculum some content are shifted from grade V to grade IV. So the students who were grade IV in 2012 and promoted to grade V in 2013 did not get the opportunity to read the shifted contents.

All the items in the tests were based on learning outcomes stipulated in the primary curriculum. However, in the tests certain learning outcomes were not addressed by adequate number of items. For example, in the Mathematics test the majority of learning outcomes included were represented by only one MCQ. This reduced the opportunities for examining achievement by learning outcomes.

Chapter 3

Achievement in Bangla Language

3.1 Student Achievements in Bangla

Success in reading provides the foundation for achievement in other subject areas and for full participation in adult life. Learning how to read and write requires effort because it cannot be achieved without mastering a collection of complex skills. Becoming a proficient reader is a goal that requires practice and dedication[3].

In the ensuing sections, what pupils know and can do in Bangla language is discussed in detail.

3.2 Bangla Item Map

Bangla item map illustrates the knowledge and skills demonstrated by pupils performing at different scale scores. This map provides concrete examples of what pupils at various achievement levels are likely to know and can do in Bangla. The Xs on the left represent pupils while on the right represent the skill or competencies tested by the items. The top of the scale shows the location of the more difficult items in Bangla and correspondingly more able pupils with Bangla proficiency. The bottom of the scale shows the location of the easy items and the less able pupils in Bangla.

Figure 2: Bangla item person map

[3] PISA 2009 Results: What Students Know and Can Do: STUDENT PERFORMANCE IN READING, MATHEMATICS AND SCIENCE Volume I.

Each 'X' represents 193.0 cases

The progress map for Bangla is empirically based, that is, it is based on the analysis of observed performances on the Grade 3 and 5 tests. The descriptors shown on the progress map are derived from some, but not all of the Bangla questions. The easiest task on both the Grade 3 and Grade 5 tests required pupils to retrieve information from short, simple mainly imaginative texts. These questions were completed correctly by most pupils and the descriptors therefore appear at the bottom of the progress map.

The descriptor at the top of the progress map; *Interpret the essence of a short poem,* refers to a reading task. This was the most difficult task on the Bangla tests. Pupils who were successful on this task were able to identify the main idea of a short poem that required understanding of figurative language.

It can be observed that Bangla pupils develop the ability to scan and retrieve information in texts prior to developing the other more difficult skills of reading comprehension.

3.3 Benchmarking Bangla Language

Bangla bands display the skills pupils demonstrated in the Bangla test in a continuum in order of difficulty from the easiest at bottom to the most difficult at the top. Band 1 skills are very basic skills and Band 5 skills are the highest level skills. *The band descriptors are developed from the 2011 data and augmented with additional information from 2013 data.*

Table 4: Band distribution in Bangla language by Grade

Grade	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	5%	20%	40%	27%	8%
Grade 5	0%	3%	20%	52%	25%

Average Grade 3 pupils have the following skills:
In simple texts they

- use simple clues to make inferences
- deduce simple word meanings
- identify main ideas in simple texts
- show knowledge of word formation (Sandhi Vicchedh)

Average Grade 5 pupils have the following skills:

- identify some types of texts based on format
- make simple inferences from a range of short, slightly more challenging texts
- know how to punctuate sentences in direct speech

A small percent of Grade 3 pupils (8 percent) and about a quarter (25 percent) of Grade 5 pupils demonstrated band 5 reading achievement. These pupils demonstrated some capacity to read inferentially. They are able to:

- infer meaning from short, challenging texts like poems, showing understanding of figurative language

- show detailed knowledge of rules of punctuation

Over a quarter (27 percent) of Grade 3 pupils and more than half (52 percent) of Grade 5 pupils achieved at band 4. These pupils demonstrated the capacity to:

- identify some types of texts based on format and make simple inferences from a range of short, slightly challenging texts
- understand familiar words used in new contexts
- punctuate sentences in direct speech

Nearly 40 per cent of the pupils in Grade 3 and nearly a fifth (20 percent) of Grade 5 pupils achieved at band 3. They were able to:

- use simple clues to make inferences, deduce word meanings and identify main ideas in simple texts
- show knowledge of word formation (Sandhi Vicchedh)

Nearly a fifth (20 percent) of Grade 3 pupils and very few (3 percent) Grade 5 pupils achieved at band 2. Pupils working in this band were able to:

- locate and interpret directly stated information in short, simple, mostly imaginative texts
- identify correct word order of simple sentences
- identify the meaning and correct spelling of high frequency words
- recognize correct use of some punctuation

Only a small percentage (5 percent) of Grade 3 pupils and virtually no (0.2 percent) Grade 5 pupils achieved within band 1 which is well below the level expected of Grade 3 pupils. Virtually all Grade 3 pupils could at least:

- locate directly stated information in short, simple, highly familiar visual and written texts

Figure 3: Bangla band description

□□□□ □□□□□□□□□□ □□□ □□□□□□
(□□□□ □□□ □□□□□□ □□ □□□□□□ □□□□□)

BSS

138

Pupils working in Band 5

- read a range of short, more challenging texts, including poems
- interpret figurative language
- identify literal and implied meaning
- connect ideas in different parts of a text
- show detailed knowledge of the rules of punctuation

122

Pupils working in Band 4

- read a range of short texts with more complex ideas
- identify main ideas, literal meaning
- make inferences
- understand the sequence of events in imaginative texts.
- identify text types based on format.
- identify meanings of familiar words in new contexts
- know how to punctuate direct speech

108

Pupils working in Band 3

- read short, simple texts of different types with some unfamiliar vocabulary
- make use of simple clues to make simple inferences and identify main ideas
- deduce simple word meanings
- show knowledge of word formation.

96

Pupils working in Band 2

- read short, simple, mostly imaginative texts
- locate and interpret directly stated information
- identify correct word orders of simple sentences
- identify the meaning and correct spelling of high frequency words
- recognize correct use of some punctuation.

85

Pupils working in Band 1

- read simple, highly familiar texts, such as signs that contain strong visual support to interpret and locate information.

The average scale score for Bangla is 104 (band 3) for Grade 3 and 115 (band 4) for Grade 5.

3.4 Bangla language achievement by Grade

Table 5: Grade wise Bangla language achievement

Grade	Number of Pupils	Mean (BSS)	Std. Deviation	Minimum	Maximum	Effect Size
Grade 3	22871	104.2	12.1	49.6	140.3	0.95
Grade 5	17828	115.2	11.0	67.1	151.2	

For Bangla, the average BSS in NSA 2013 is 104.2 for Grade 3 and 115.3 for Grade 5. This difference is strongly statistically significant (p-value=0.000). The effect size of 0.95 indicates a large difference in average Bangla achievement between Grade 3 and 5. It is inferred that there is a strong learning growth observed between these two grades.

Figure 4: Learning growth in Bangla language over Grade 3 to Grade 5

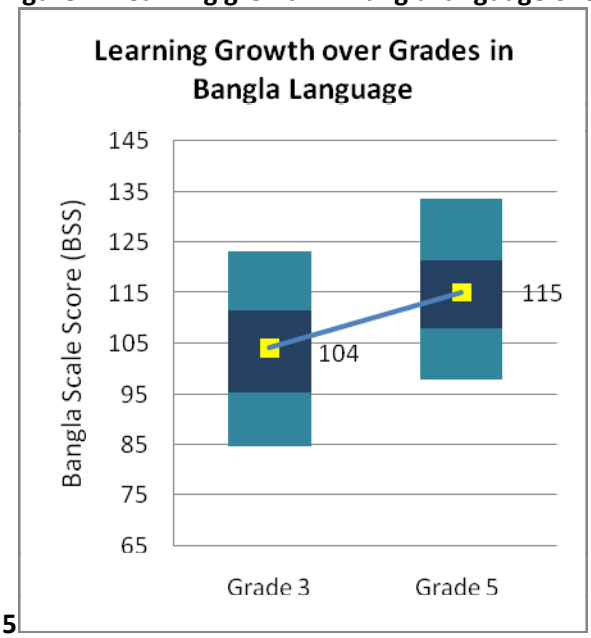


Table 6: Comparison of Bangla achievement between 2011 and 2013

Grade	NSA 2011			NSA 2013			Effect size
	Number of Pupils	**Mean (BSS)**	**Std. Deviation**	**Number of Pupils**	**Mean (BSS)**	**Std. Deviation**	
Grade 3	17615	100.2	9.8	22869	104.2	12.1	0.37
Grade 5	13854	116.2	8.7	17828	115.2	11.0	0.10

The mean BSS for Grade 3 increased by 4 scale score points from 100 in 2011 to 104 in 2013. In Grade 5 the 2011 mean BSS decreased by 1 scale score point from 116 to 115 in 2013. Change at

Grade 3 level is moderate but the change at Grade 5 level is small and even, if not, random fluctuations are likely to be of little practical significance.

Figure 5: Change in Bangla achievement between 2011 and 2013 cycles

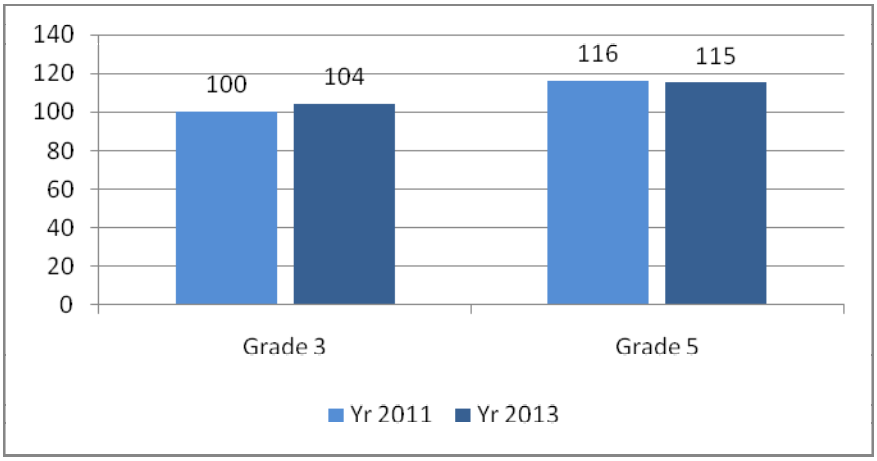
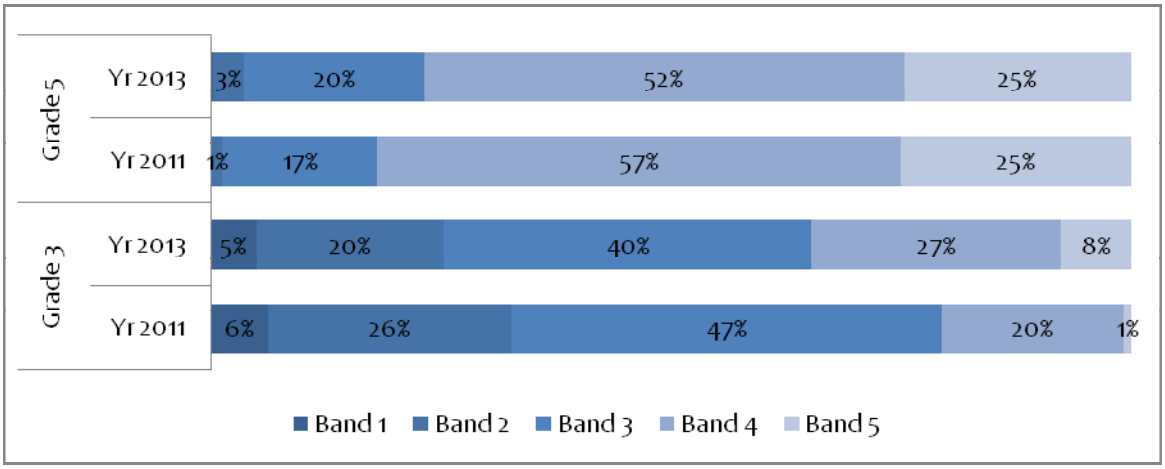


Figure 6: Trend in Bangla band distribution between 2011 and 2013 cycle



Variations in percent of pupils achieving in a band are evident at both grade levels, but there is no visible pattern of change in Grade 5 that suggests systematic improvement or decline in learning by pupils. However, it is evident that 14 percent of Grade 3 pupils shifted from lower bands to higher bands (Bands 4 and 5). Further investigation may help to understand the reasons for this development.

3.5 Bangla language achievement by Gender

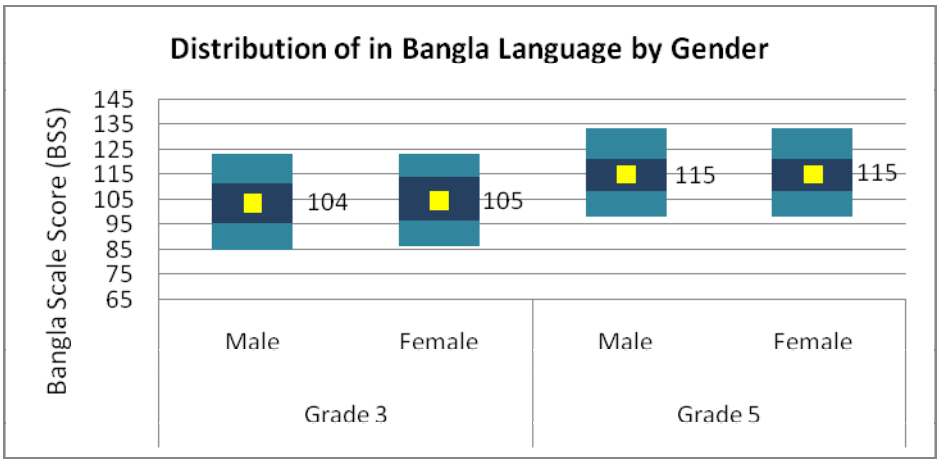
Table 7：Bangla Language achievement by Gender

Gender	Grade 3	Grade 5

	Number of Pupils	Mean (BSS)	Std. Deviation	Number of Pupils	Mean (BSS)	Std. Deviation
Male	10862	103.7	11.9	8032	115.2	10.8
Female	12007	104.7	12.2	9796	115.2	11.1
Total	22869	104.2	12.1	17828	115.2	11.0
Effect Size		0.1			0.0	

There was little difference between boys and girls in Grade 3 or Grade 5. These results are consistent with the 2011 results. This is in contrast with the gender differences reported in most other national and international testing programmes. Recent research in the United States has found that females have an advantage on reading at all levels from kindergarten through to Year 8 (Robinson[4] & Lubienski, 2011). Cross-nationally, the previous cycles of PIRLS reported significant gender differences in favour of females in every participating country in 2001 (Mullis[5], Martin, Gonzalez and Kennedy, 2003) and in all but two countries in PIRLS 2006 (Mullis[6], Martin, Kennedy & Foy, 2007).

Figure 7: Bangla language distribution by Gender



The percentile distribution and the distribution across the bands of both the grades for boys and girls achievement in Bangla are similar.

Table 8: Band distribution in Bangla language by Gender

Grade	Gender	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	Male	5%	21%	41%	26%	7%
	Female	5%	20%	39%	28%	8%
Grade 5	Male	0%	4%	19%	53%	24%
	Female	0%	3%	20%	51%	25%

[4] Robinson, J. P. & Lubienski, S. T. (2011). The development of gender achievement gaps in mathematics and reading during elementary and middle school: Examining direct cognitive assessments and teacher ratings. *American Educational Research Journal, 48*, (2), 268 – 302. DOI: 10.3102/0002831210372249.

[5] Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., & Kennedy, A.M. (2003). *PIRLS 2001 International Report: IEA's Study of Reading Literacy Achievement in Primary Schools*. Chestnut Hill, MA: Boston College.

[6] Mullis, I.V.S., Martin, M.O., Kennedy, A.M. & Foy, P. (2007). *IEA's Progress in International Reading Literacy Study in Primary School in 40 Countries.* Chestnut Hill, MA: Boston College.

Table 9: Trends in Bangla Achievement between 2011 and 2013 by Gender

Grade	NSA 2011				NSA 2013			Effect Size
	Gender	Number of Pupils	Mean (BSS)	Std. Deviation	Number of Pupils	Mean (BSS)	Std. Deviation	
Grade 3	Male	8502	100	9.6	10862	103.7	11.9	0.34
	Female	9113	100.5	10	12007	104.7	12.2	0.37
Grade 5	Male	6458	116.2	8.6	8032	115.2	10.8	0.10
	Female	7395	116.3	8.8	9796	115.2	11.1	0.11

Bangla achievement of boys and girls of Grade 3 in 2013 increased by 4 scale score points as compared to 2011 which is considered medium as per the effect size. However for Grade 5, Bangla achievement of boys and girls in 2013 is similar to that of boys and girls in 2011.

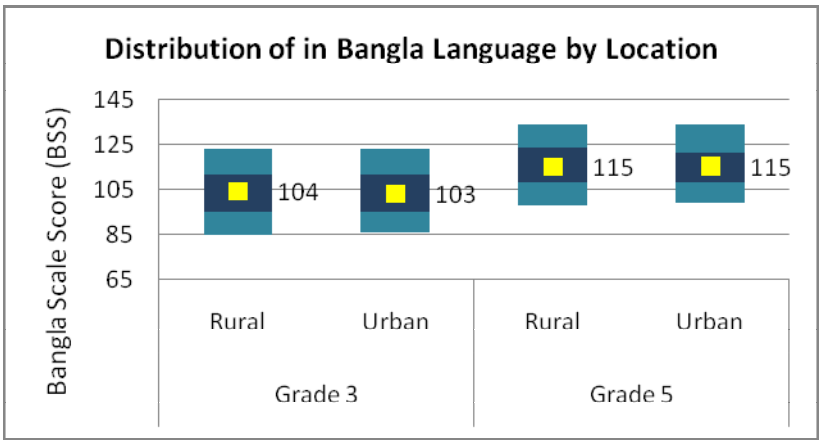
3.6 Bangla language achievement by geographical location

Table 10: Bangla language achievement by location

Geo Location	Grade 3			Grade 5		
	Number of Pupils	Mean (BSS)	Std. Deviation	Number of Pupils	Mean (BSS)	Std. Deviation
Rural	17086	104.5	12.4	13301	115.1	11.2
Urban	5783	103.3	11.0	4527	115.5	10.5
Total	22869	104.2	12.1	17828	115.2	11.0
Effect size		0.1			0.0	

In Bangla, there was no statistical difference between rural and urban pupils in Grade 5 and a very slight difference was observed between rural and urban pupils in Grade 3.

Figure 8: Bangla language distribution by Location



The percentile distribution of both the grades indicates that rural and urban pupils are more or less similarly distributed.

Table 11: Band distribution in Bangla language by Location

Grade	Location	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	Rural	5%	20%	39%	28%	8%
	Urban	4%	22%	44%	25%	5%
Grade 5	Rural	0%	4%	20%	51%	25%
	Urban	0%	2%	18%	55%	24%

In Grade 3, nearly 36 per cent rural pupils performed in Bands 4 and 5 compared with 30 per cent urban pupils. In Grade 5 nearly 79 per cent urban pupils performed in bands 4 and 5 and approximately 76 per cent rural pupils performed at these levels.

3.7 Bangla language achievement by Division

Table 62: Bangla language achievement by division

Division	Grade 3	Grade 5

	Number of Pupils	Mean (BSS)	Std. Deviation	Number of Pupils	Mean (BSS)	Std. Deviation
BARISAL	1278	108.5	11.9	1115	118.2	10.8
CHITTAGONG	4962	105.7	12.1	3919	115.3	11.5
DHAKA	6883	101.9	11.7	5145	114.7	10.6
KHULNA	2430	103.7	11.2	2038	113.9	9.2
RAJSHAHI	2782	106.9	12.8	2171	117.6	10.8
RANGPUR	2606	105.5	10.7	2054	116.4	11.0
SYLHET	1928	100.9	12.7	1386	111.2	12.2
Total	22869	104.2	12.1	17828	115.2	11.0

Mean differences by division for Bangla were not large. For both grades, Barisal and Rajshahi had the highest means while Sylhet has the lowest.

Figure 9: Grade 3 Bangla language distribution by Division

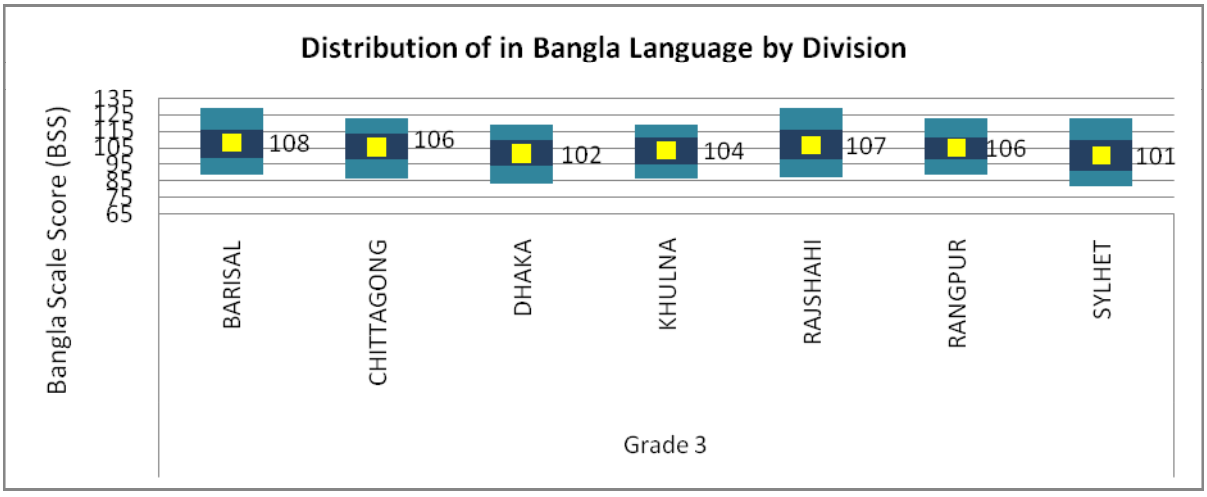
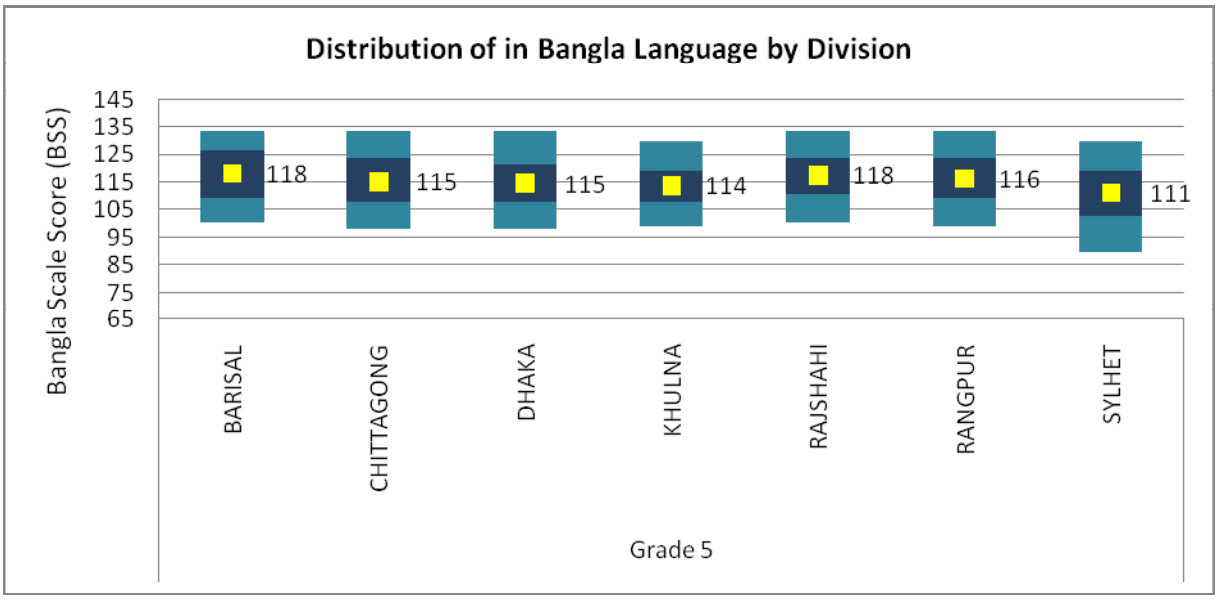


Figure 5: Grade 5 Bangla language distribution by Division



In both grades, Khulna division had the lowest range of performance, indicating less difference between the strongest and the weakest pupils compared with other divisions.

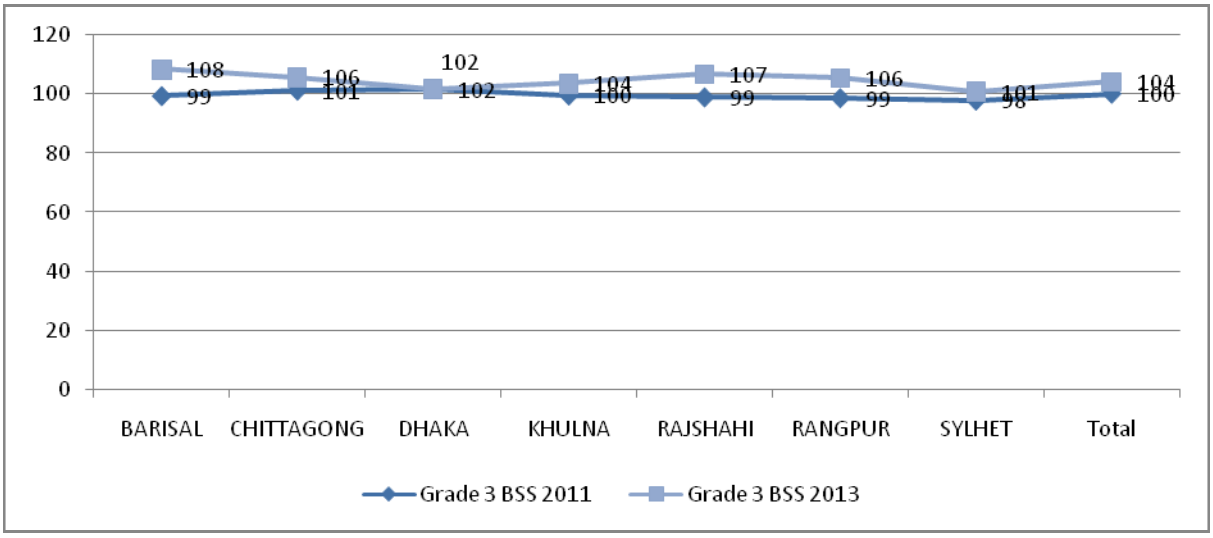
Table 73: Band distribution in Bangla language by Division

Grade	Division	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	BARISAL	2%	14%	34%	36%	14%
	CHITTAGONG	4%	17%	39%	30%	10%
	DHAKA	8%	23%	42%	23%	4%
	KHULNA	4%	23%	41%	27%	5%
	RAJSHAHI	4%	17%	36%	30%	14%
	RANGPUR	2%	16%	44%	31%	6%
	SYLHET	9%	28%	38%	19%	6%
Grade 5	BARISAL		2%	16%	44%	39%
	CHITTAGONG	0%	3%	21%	49%	26%
	DHAKA	0%	3%	21%	54%	22%
	KHULNA	0%	3%	20%	62%	15%
	RAJSHAHI	0%	2%	14%	52%	32%
	RANGPUR	0%	2%	18%	52%	28%
	SYLHET	2%	11%	23%	46%	19%

The high performing divisions in Bangla in both grades were Barisal and Rajshahi, with 50 percent of Grade 3 pupils and 83 per cent of Grade 5 Barisal pupils achieving at bands 4 and 5. In Rajshahi 43 percent of Grade 3 pupils and 84 per cent of Grade 5 pupils achieved at bands 4 and 5. Sylhet and Dhaka have larger percentages (9 and 8 per cent respectively) of Grade 3 pupils at Band 1. This compares with 5 per cent of pupils in Band 1 at the national level (Table No. 5) in Grade 3. Only 4 to 5 percent of Grade 3 pupils from Dhaka and Khulna reached band 5 level.

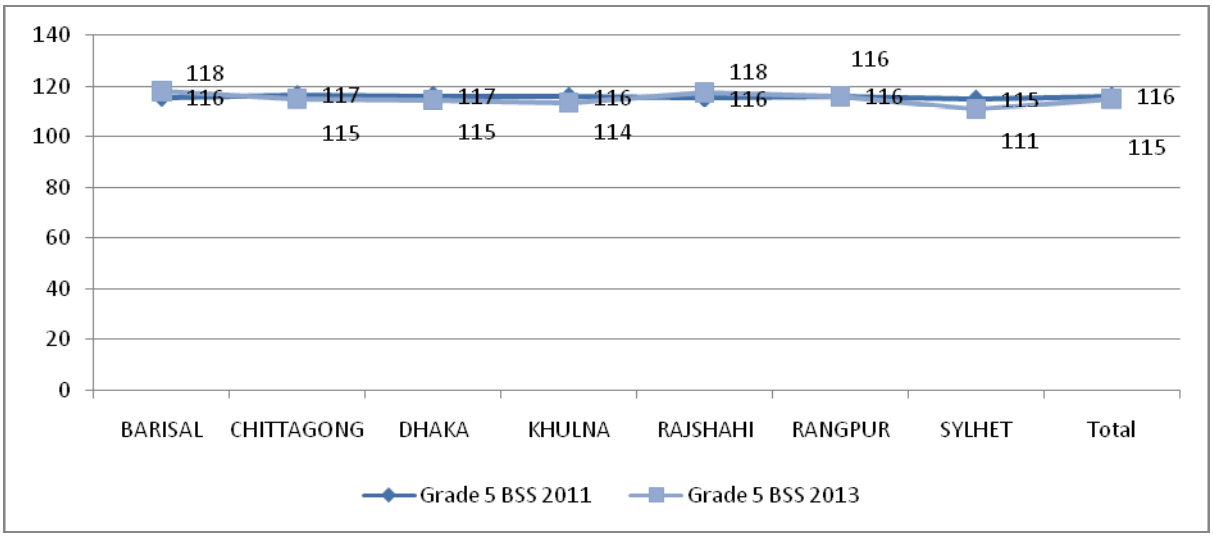
Patterns of strength and weakness by division in Grade 5 are similar to those of Grade 3; Barisal and Rajshahi have 39 and 32 percent of pupils achieving at Band 5 while Sylhet results show 36 percent of pupils attaining no better than Band 3.

Figure 11: Change in Grade 3 Bangla achievement by Division during 2011 and 2013



The performance of the divisions is very similar in both grade levels from 2011 to 2013 but the rank order of divisions changed. Barisal, Rajshahi and Rangpur divisions have shown 7 to 9 score point improvement in the mean BSS for Grade 3. While the rank order of Dhaka division dropped from first to third, it should be noted that its mean score remained exactly the same for Grade 3 during both 2011 and 2013 cycles.

Figure 12: Change in Grade 5 Bangla achievement by Division during 2011 and 2013



Between 2011 and 2013, Grade 5 the mean BSS remained nearly same for all the divisions.

3.8 Bangla language achievement by type of school management

Table 84: Bangla language achievement by School type

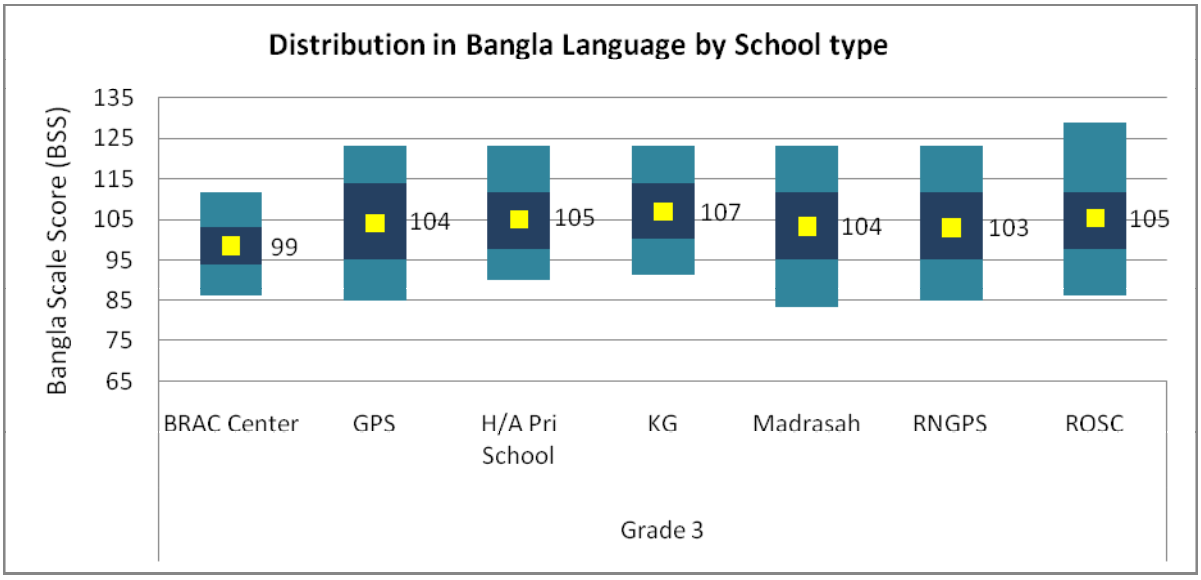
School Type	Grade 3			Grade 5		
	Number of Pupils	Mean (BSS)	Std. Deviation	Number of Pupils	Mean (BSS)	Std. Deviation
BRAC Center	414	98.7	7.8	944	112.4	8.2

GPS	13322	104.3	12.5	10633	116.3	11.1
H/A Pri School	869	105.2	9.8	710	114.1	11.8
KG	1485	107.1	10.5	1187	118.2	10.2
Madrasah	1078	103.5	12.2	935	110.4	12.0
RNGPS	4619	103.2	11.5	3419	113.1	10.3
ROSC	1082	105.5	12.7	-	-	-
Total	22869	104.2	12.1	17828	115.2	11.0

In Grade 3, the average scale score of pupils in KG schools was the highest in Bangla (107.1 BSS), while the average scale score in BRAC centre was the lowest (98.7 BSS). There was a medium to large difference in Bangla scale score between BRAC centre and other school types. However, there was a small difference in BSS among other school types.

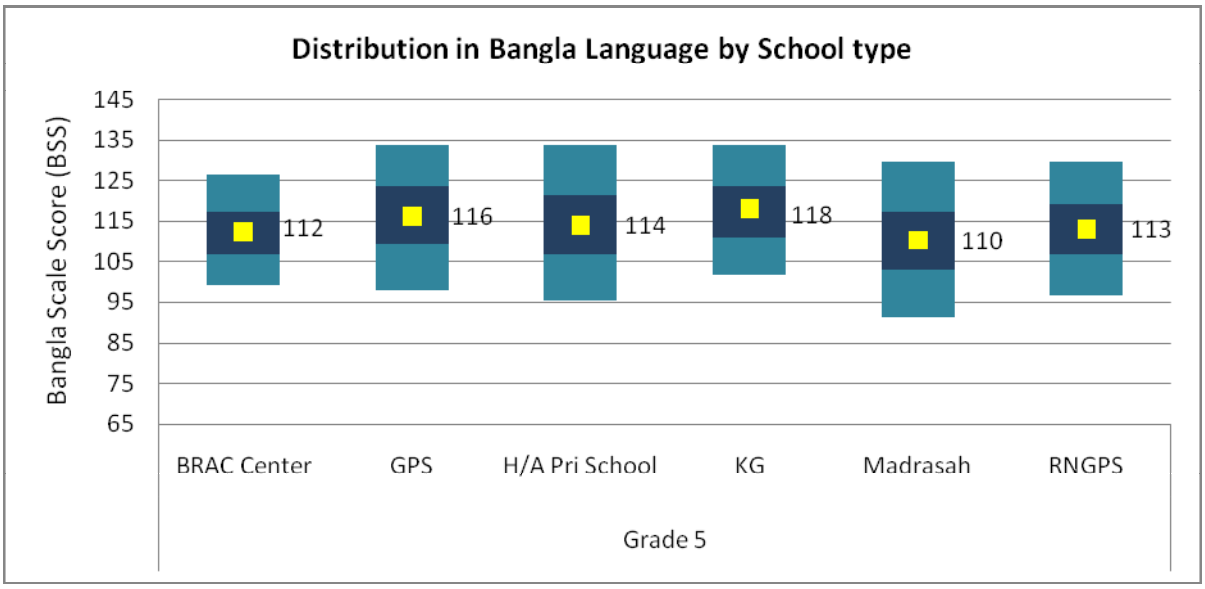
In Grade 5, the average scale score of pupils in KG schools was the highest in Bangla (118.2 BSS), while the average scale score in Madrasah was the lowest (110.4 BSS). There was a medium to large difference in Bangla scale score between Madrasah and KG schools, Madrasah and GP schools and KG and RNGP schools.

Figure 13: Grade 3 Bangla language distributions by School type



For Grade 3, the performance distribution in BRAC centre has the lowest range compared to the other schools types.

Figure 14: Grade 5 Bangla language distributions by School type



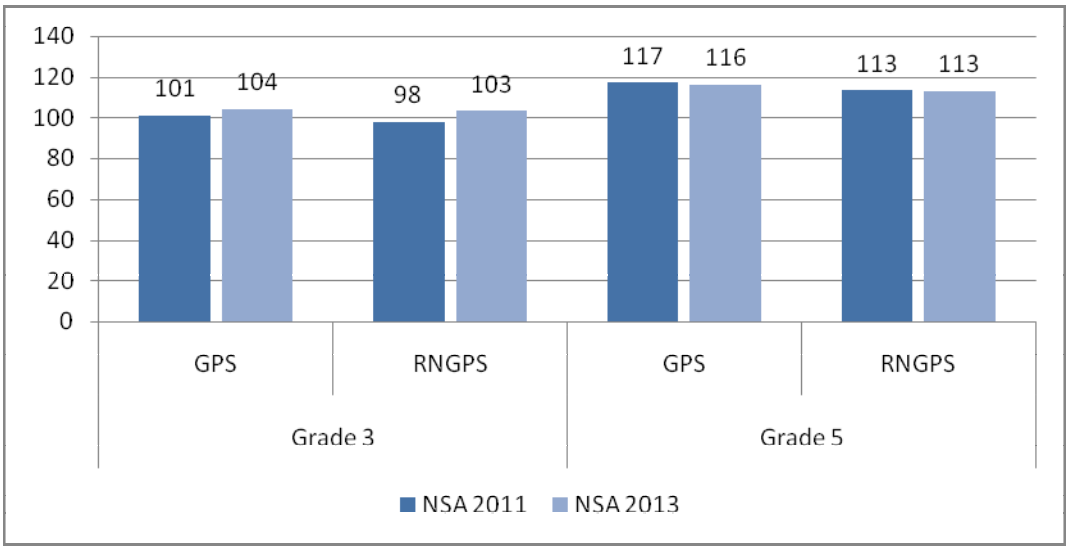
For Grade 5, the performance distribution in BRAC centers has the lowest range, and therefore the most homogeneous performance by school type.

Table 15: Band distribution in Bangla language by school type

Grade	School Type	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	BRAC Center	4%	32%	51%	13%	
	GPS	5%	21%	37%	28%	9%
	H/A Pri School	1%	18%	45%	29%	6%
	KG	1%	10%	49%	32%	8%
	Madrasah	8%	17%	40%	29%	6%
	RNGPS	5%	21%	43%	26%	5%
	ROSC	4%	16%	47%	22%	11%
Grade 5	BRAC Center		2%	25%	61%	12%
	GPS	0%	3%	17%	52%	28%
	H/A Pri School	0%	5%	21%	50%	23%
	KG		1%	13%	53%	33%
	Madrasah	1%	10%	30%	44%	16%
	RNGPS	0%	4%	25%	53%	18%

Nearly 40 per cent of Grade 3 pupils performed at band 4 and 5 levels in KG schools compared with 13 per cent in BRAC centers. Conversely, 11 per cent of Grade 3 KG pupils performed at band 1 and 2 compared with 36 per cent from BRAC centers. Nearly 87 per cent of Grade 5 pupils performed at band 4 and 5 levels in KG schools compared with 60 per cent in Madrasah. Nearly 11 per cent of Grade 5 pupils from Madrasah performed at bands 1 and 2.

Figure 15: Change in Bangla achievement from 2011 to 2013 by School Type



In 2011 the data were disaggregated only to GPS and RNGPS. Comparison between 2011 and 2013 can therefore only be made for these two school types. In Grade 3, Bangla scale score improved marginally for both GP and RNGP schools and for Grade 5 the Bangla achievement more or less remained same.

Chapter 4
Achievement in Mathematics

4.1 Student Achievements in Mathematics

Mathematical literacy helps individuals recognize the role that mathematics plays in the world and make well-founded judgments and decisions needed by constructive, engaged and reflective citizens. PISA defines Mathematical literacy as Individual's capacity to formulate, employ and interpret mathematics in a variety of contexts[7]. The NSA mathematics tests assessed skills required by the pupils at primary level that are essential for further development of mathematics. For example, pupils were required to show if they were able to formulate/ identify equivalent or alternate processes to simplify computational tasks. Such tasks assess pupils' ability to evaluate different, equivalent processes, key skills in higher order mathematical thinking.

4.2 Mathematics Item Map

Math item map illustrates the knowledge and skills demonstrated by pupils performing at different scale scores. This map provides concrete examples of what pupils at various achievement levels are likely to know and can do in mathematics. The top of the scale shows the location of the more difficult items in mathematics and correspondingly more able pupils with mathematical ability. The bottom of the scale shows the location of the easy items and less able pupils in mathematics.

Figure 16 Maths item person map

```
145          |
             X|
  4          X|
             X|
             X|
             X|
            XX|
            XX| Calculate perimeter of a rectangle in real life context
           XXX|
  3        XXX|
          XXXX|
          XXXX|
124       XXXXX|
          XXXXX|
         XXXXXX|
  2      XXXXXX| Calculate mean of a data set presented pictorially as a bar graph using the scale of measurement
         XXXXXX| Classify triangles
```

[7] PISA 2009 Results: What Students Know and Can Do: STUDENT PERFORMANCE IN READING, MATHEMATICS AND SCIENCE. Volume I

```
      XXXXXXXX| Apply strategies to work out altitude, base length or area of a triangle, convert area measure from square metres to hectares
      XXXXXXXX| Solve word problems involving fractions in real context, calculate HCF, Read bar graphs and categories with equal frequencies
     XXXXXXXXX| Apply conversion between different units of mass and add mass of objects in real life context, identify parts of a circle (radius)
113  XXXXXXXXX| Calculate LCM of numbers, subtract two mixed fractions after conversion to improper fraction/ other wise
     XXXXXXXXX| Multiply fractions with whole numbers, calculate sum of the angles in context, can do money transactions involving decimals
  1 XXXXXXXXXX| Find the fractional equivalent of percentages and add length in real life context, and convert metres to kilometres,
    XXXXXXXXXX| Choose equivalent process to find a missing number, divide money involving decimal equally, multiply and simplify mixed fractions
    XXXXXXXXXX| Calculate mean of four numbers presented in tabular form, read volume of liquid in graduated container, convert kilograms to grams,
    XXXXXXXXXX| Find total number of observations in a bar graph, use unitary method to calculates unit price of an item from cost of many items
     XXXXXXXXX| Identify equivalent process of multiplication by 99 as multiplication by (100 - 1)
101  XXXXXXXXX| Work out the quotient when number is divided by 100, subtract small amounts of money involving decimal
  0   XXXXXXXX| Subtract two 6-digit numbers, identify fractional equivalent of percentage, calculate average of three numbers in context
      XXXXXXXX| Identify similarities between familiar 2-D shapes, classify angles (obtuse angle), solve problems on area of a rectangle in context
       XXXXXXX| Identify 4-digit numerals in words, compare like fractions, calculate area of a rectangle, solve familiar two stage word problems
        XXXXXX| Add time without unit conversion; add simple cases of mixed like fractions.
        XXXXXX| Multiply 3-digit number by 1-digit number, identify familiar geometrical shapes in context and convert metres to centimetres
         XXXXX| Identify the place value of a digit in 4-digit number, add time without unit conversion
90        XXXX| Identify appropriate unit of measurement, find time remaining to the next complete hour, add like fractions
 -1       XXXX| Recognise familiar 2-D shapes, order 2-digit numbers
          XXX|
          XXX| Add 2-digit numbers without regrouping in real context, add mass of standard weights with unit conversion; convert hours to days
           XX| Identify even numbers and smallest category in a bar graph, add four numbers, subtract a 3-digit number from a 4-digit number
           XX| Recognise the expanded form of a number, conversion of kilograms to grams, multiply 3-digit number with a 1-digit number
            X| Add three numbers involving 3-digits at most without regrouping
 - 2        X| Recognise different types of surfaces (plane surface) of familiar object; shape of familiar object in context; familiar 2-D shape
            X| Relate multiplication in context of pairs as multiplication by 2; multiply a 3-digit number by a 2-digit number.
            X|
              | Recognise familiar 2-D shapes
              | Identify a number smaller than a given 4-digit number
---------------------------------------------------
Each 'X' represents 188.0 cases
```

The progress map for mathematics is empirically based, that is, it is based on the analysis of observed performances on the Grade 3 and Grade 5 tests. The descriptors shown on the progress map are derived from some, but not all of the mathematics questions. The easiest questions on both the Grade 3 and Grade 5 tests required pupils to identify simple 2D shapes and compare simple numbers. These questions were correctly answered by most pupils and the descriptors of these questions appear at the lower end of the progress map.

The descriptor at the top of the progress map, *Calculate perimeter of a rectangle in real life context*, refers to pupils understanding the word problem related to a real life situation and then choosing the appropriate method to get the perimeter of a rectangle where the word perimeter is not explicitly stated.

4.3 Benchmarking Mathematics achievement

Based on curriculum documents and the questions used to test pupils in Grade3 and Grade 5, broad descriptions of skills have been developed. Mathematics bands display the skills pupils demonstrated in the mathematics test in a continuum in order of difficulty from the easiest at bottom to the most difficult at the top. Band 1 skills are very basic skills and Band 5 skills are the highest level skills. *The band descriptors are developed from the 2011 data and augmented with additional information from 2013 data.*

Table 16: Band distribution in mathematics by Grade

Grade	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	15%	28%	33%	20%	4%
Grade 5	1%	10%	30%	34%	25%

The average scale score for mathematics is 104 (band 3) for Grade 3 and 116 (band 4) for Grade 5.

Average Grade 3 pupils most likely have the following skills:

- count, compare, add and subtract numbers up to 4 digits, identify place value of a digit, use mathematical operations to solve 2 stage simple word problems in familiar real life contexts
- measure quantities of length, mass, capacity in routine problems and real life contexts, read time and calculate time lapsed or time intervals without unit conversion

- identify simple geometric shapes (2D and 3D)

Average Grade 5 pupils most likely have the following skills:

- solve word problems including money transactions involving decimals; add, subtract, multiply and divide whole numbers; add and subtract decimals; find HCF of small numbers; identify and represent fractions, add, subtract, and multiply fractions; solve two stage word problems related to addition and subtraction
- set up a mathematical expression (equation) for a given situation; find the value of an unknown in a given simple mathematical expression
- convert between different units of length measure (cm/mm to cm/m, kg to gm) and area measure (square metres to hectares), calculate area of a triangle from given information
- identify the distinguishing properties of 2D objects
- read bar graphs including use of scale to read the frequencies

A small per cent of Grade 3 pupils (4 per cent) and 25 per cent of Grade 5 pupils demonstrated band 5 mathematics achievement. These pupils demonstrated well developed understanding of mathematical content and skills and a capacity to show higher mathematical skills. They were able to:

- apply strategies to simplify numerical expressions, use unitary method
- apply geometric properties and relations in solving angle problems
- apply ideas of area and perimeter in contexts where inferring the use of concepts was required

Nearly one-fifth (20 per cent) of Grade 3 pupils and a third (34 per cent) of Grade 5 pupils achieved band 4 level. These pupils demonstrated capacity to:

- solve word problems involving decimals in money transactions, represent, compare and do operations of addition, subtraction and multiplication of fractions, apply strategies to solve two stage word problems,
- convert between different units of measure in linear measure of length, mass and time; convert between different units of area (square meters and hectares)
- understand the properties of familiar 2D shapes
- calculate mean of data set

Nearly a third (33 per cent) of the pupils in Grade 3 and 30 per cent of Grade 5 pupils achieved in band 3.They were able to:

- use mathematical operations of numbers up to 6-digits with regrouping and among fractions; find LCM of three numbers; recognise equivalent processes to get the answer
- calculate elapsed time or duration of activity
- identify 3D shapes and classify simple geometric shapes (triangles)
- use tally charts and frequency table

Under a third (28 per cent) of Grade 3 and 10 per cent of Grade 5 pupils achieved band 2. Pupils working in this band:

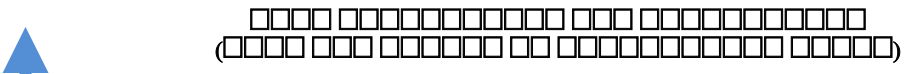
- identify place value of digits, order numbers, do mathematical operations without regrouping, identify equivalent simple fractions, solve two stage familiar simple word problems
- recognise currency
- read time in an analogue clock to the nearest quarter hour and convert hours to days

- choose the appropriate unit of measurement, convert metres to centimetres and find area of rectangles

About 15 per cent of Grade 3 pupils and only a small percentage (1 per cent) of Grade 5 pupils were working within band 1. They can

- count, compare, identify numerals up to 3-digits
- add and subtract without regrouping
- read date and day on a calendar
- identify familiar 2D shapes

Figure 17:Mathematics band description



MSS	
145	
	Pupils working in Band 5 apply strategies to simplify numerical expressions and solve word problems on percentages and unitary method apply geometric properties and relations in solving simple problems on angles calculate the perimeter of simple geometric shapes in real context
124	
	Pupils working in Band 4 apply strategies to solve word problems including money transactions using skills of addition, subtraction, multiplication and division of whole numbers, add/ subtract and simplify decimals, find the HCF of small numbers, identify and represent fractions, multiply and divide whole numbers by fractions, solve word problems related to addition and subtraction set up a mathematical expression(equation) for a given situation, find the value of an unknown in a given simple mathematical expression convert different units of length measure(cm/mm to cm/m, kg to gm) and area measure (square metres to hectares) , calculate area of a triangle from given dimensions, identify the distinguishing properties of 2D objects, calculate averages from data presented pictorially
113	
	Pupils working in Band 3 add and subtract 6-digit numbers (negative numbers excluded) identify the remainder on division by 100, find LCM of given numbers, uses addition/subtraction and multiplication to solve 2 stage word problems, can convert fractions to mixed fractions, percentages and decimals, add, subtract and multiply like fractions including decimal fractions by whole numbers, identify equivalent mathematical processes form simplification, find the unit price of an item using unitary method calculate elapsed time and read a 24 hour clock format measure the volume of a liquid shown in a graduated cylinder and calculate the area of a rectangle identify 3D shapes and classify triangles use tally charts and frequency tables
101	
	Pupils working in Band 2 identify place value in numbers up to 4-digit numbers, orders 2-digit numbers, compare two numerical expressions add and subtract numbers up to 4-digits (without carry over) divide a 3-digit number by a 1-digit number, use addition, subtraction and multiplication to solve two stage problems, recognise, order and find equivalent simple fractions recognise and name currency in words and figures read time an analogue clock to the nearest quarter hour, convert hours to days identify appropriate unit of measurement, convert metres and centimetres to metres, calculate area of a rectangle
90	
	Pupils working in Band 1 identify, count and compare numbers up to 3-digits, add and subtract numbers up to 4-digits (without carry over), identify even and odd numbers read date and day on a calendar read simple graphs recognise and draw simple 2D shapes and identify types of surfaces(plane surface)

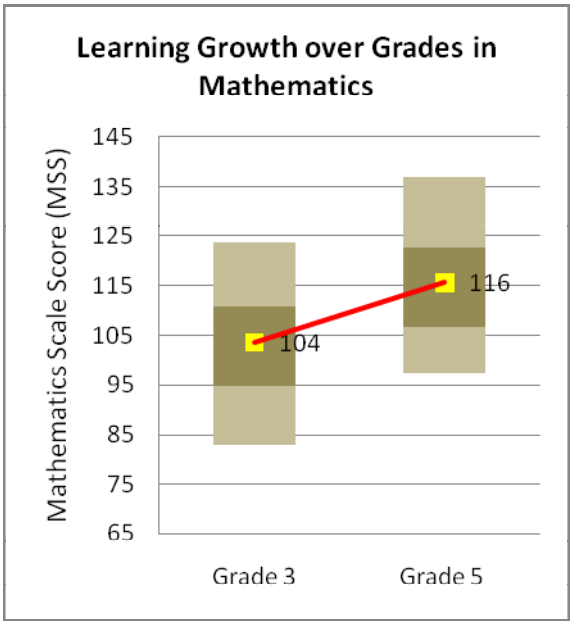
4.4 Mathematics achievement by Grade

Table 17: Mathematics achievement by Grade

Grade	Number of Pupils	Mean (MSS)	Std. Deviation	Minimum	Maximum	Effect Size
Grade 3	23064	103.7	13.0	45.8	142.3	0.95
Grade 5	17806	115.8	12.4	76.5	154.7	
Total	40870	108.9	14.1	45.8	154.7	

For mathematics, the average MSS in NSA 2013 is 103.7 for Grade 3 and 115.8 for Grade 5. This difference is strongly statistically significant (p-value=0.000). The effect size of 0.95 indicates a large difference in average mathematics achievement between Grade 3 and 5. It is inferred that there is a strong learning growth observed between these two grades.

Figure 18: Learning Growth in Mathematics



The results from the 2013 NSA show strong growth from Grade 3 to Grade 5. The average scale score for mathematics was 103.7 (band 3) for Grade 3 and 115.8 (band 4) for Grade 5.

Table 18: Comparison of mathematics achievement between 2011 and 2013

Grade	NSA 2011			NSA 2013			Effect Size
	Number of Pupils	Mean (MSS)	Std. Deviation	Number of Pupils	Mean (MSS)	Std. Deviation	
Grade 3	17626	100.8	11.6	23064	103.7	13.0	0.23
Grade 5	13827	118.6	11.1	17806	115.8	12.4	0.24

The mean MSS for Grade 3 increased by 3 scale score point from 101 during 2011 to 104 in 2013. However, the mean MSS for Grade 5 decreased by 3 scale score point from 119 during 2011 to 116 in 2013. Changes at both levels are small and are likely to have little practical significance.

Figure 19: Change in mathematics achievement between 2011 and 2013 cycle

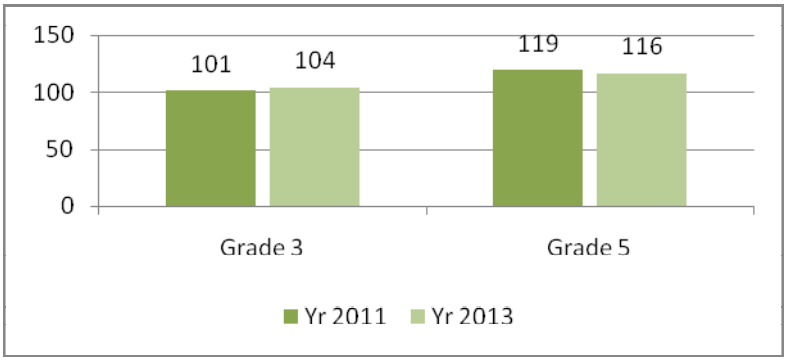
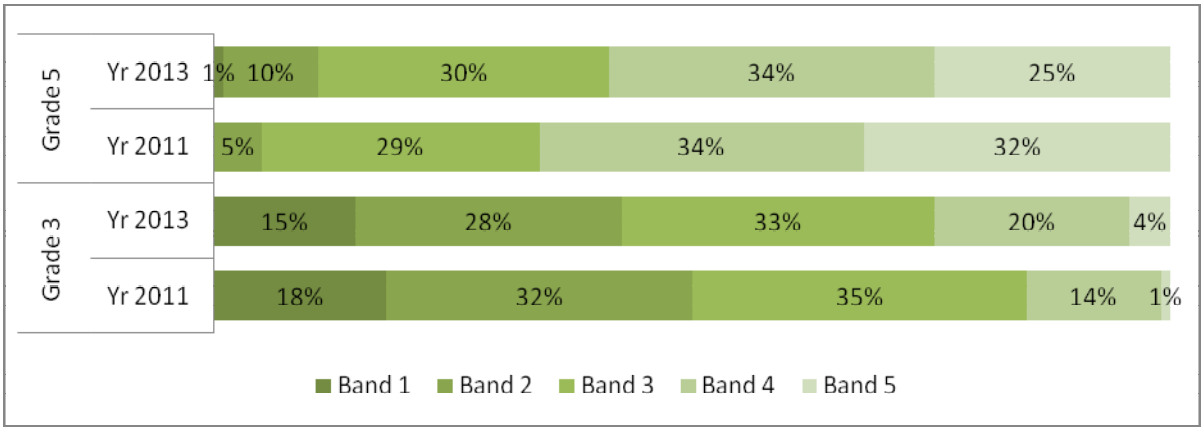


Figure 20: Trend in mathematics band distribution in 2011 and 2013 cycle



Variations in per cent of pupils achieving in a band were evident at both grade levels, but there is no discernible pattern of change.

4.5 Mathematics achievement by Gender

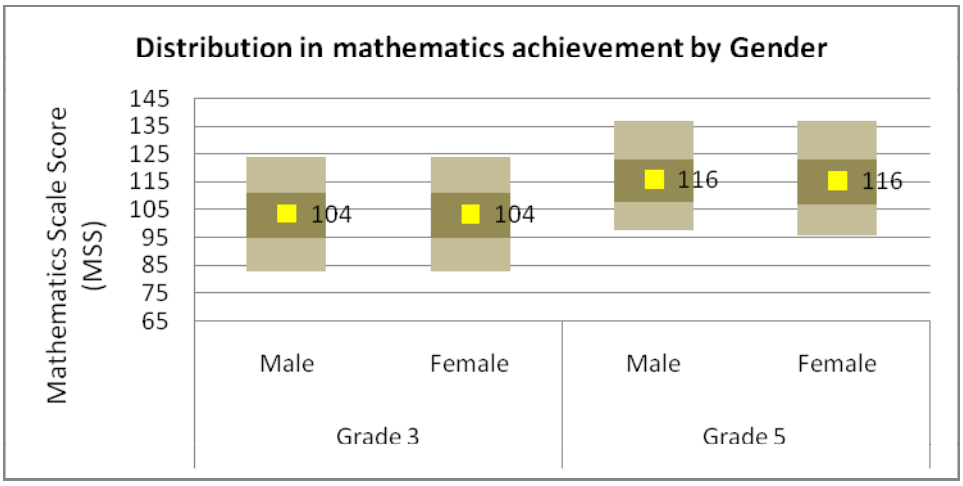
Table 19: Mathematics achievement by Gender

Gender	Grade 3			Grade 5		
	Number of Pupils	Mean (MSS)	Std. Deviation	Number of Pupils	Mean (MSS)	Std. Deviation
Male	10965	103.8	12.6	8030	116.0	12.2
Female	12099	103.5	13.3	9776	115.6	12.7
Total	23064	103.7	13.0	17806	115.8	12.4
Effect Size		0.02			0.04	

In mathematics, there was a small difference between boys and girls in both Grade 3 and Grade 5. Though the difference is statistically significance (p=0.07 for Grade 3; p=0.02 for Grade 5), the small difference is likely to have very little practical significance. These findings are consistent with the

performance of boys and girls of similar ages in International studies like TIMSS[8]. In TIMSS 2011 cycle there was little achievement difference between female and male pupils in mathematics across countries at Year 4 level. Twenty-six countries, including Australia, had no significant gender difference in mathematics achievement. Of the 24 remaining countries, 20, including the United States, had small differences favouring male pupils, and four had relatively larger differences favouring female pupils (Qatar, Thailand, Oman and Kuwait).

Figure 22: Distribution in mathematics achievement by Gender



The percentile distribution of both the grades indicates that boys and girls achievement in mathematics is similarly distributed.

Table 20: Band distribution in mathematics by Gender

Grade	Gender	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	Male	14%	28%	34%	21%	4%
	Female	16%	27%	32%	20%	5%
Grade 5	Male	1%	9%	30%	35%	25%
	Female	1%	11%	31%	33%	25%

Table 21: Trend in mathematics achievement between 2011 and 2013 by Gender

Grade	Gender	NSA 2011			NSA 2013			Effect Size
		Number of Pupils	Mean (MSS)	Std. Deviation	Number of Pupils	Mean (MSS)	Std. Deviation	
Grade 3	Male	8505	101.1	11.3	10965	103.8	12.6	0.22
	Female	9121	100.4	11.9	12099	103.5	13.3	0.25

[8]http://www.acer.edu.au/documents/TIMSS-PIRLS_Monitoring-Australian-Year-4-Student-Achievement.pdf

Grade 5	Male	6437	119.0	10.8	8030	116.0	12.2	0.26
	Female	7390	118.2	11.4	9776	115.6	12.7	0.22

The mean MSS for Grade 3 increased by 3 to 4 scale score point between 2011 and 2013 for both boys and girls. However, the mean MSS for Grade 5 decreased by 3 scale score point between 2011 and 2013. Changes at both levels are small and are likely to have little practical significance.

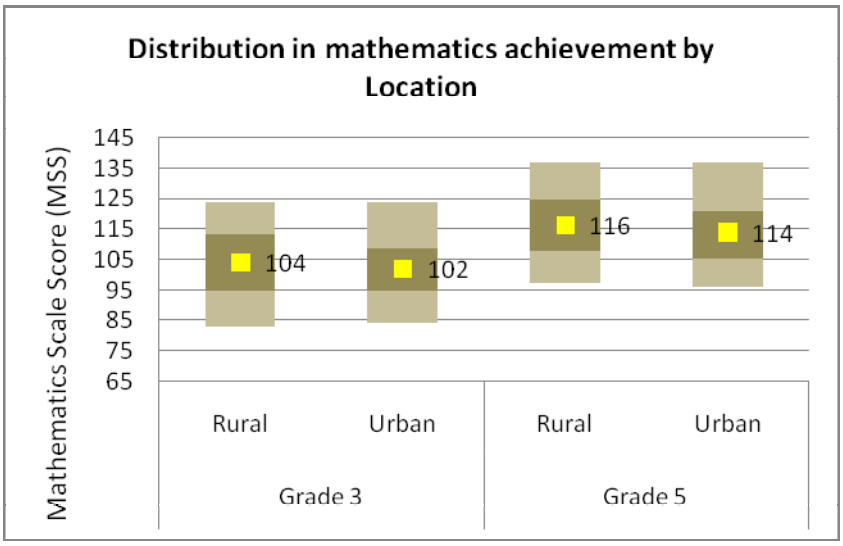
4.6 Mathematics achievement by Geographical Location

Table 22: Mathematics achievement by Location

Geo Location	Grade 3			Grade 5		
	Number of Pupils	Mean (MSS)	Std. Deviation	Number of Pupils	Mean (MSS)	Std. Deviation
Rural	17248	104.2	13.3	13275	116.4	12.6
Urban	5816	102.0	11.8	4531	114.0	11.9
Total	23064	103.7	13.0	17806	115.8	12.4
Effect Size		0.17			0.20	

In mathematics, there was a small statistically significant difference (p-value=0.000) between rural and urban pupils in both Grade 3 and 5. This result is consistent with the National Assessment of Educational Progress (NAEP[9]) of USA. At the 4th, 8th, and 12th grades, students in the urban fringe/large town locations had higher scale scores on the NAEP national mathematics assessment than students in central city locations (NCES 2001f.) At Grades 4 and 8, students in rural/small town locations also outperformed their counterparts in the central city locations.

Figure 21: Distribution in mathematics achievement by Location



[9] http://www.nsf.gov/statistics/seind02/c1/c1s1.htm

The percentile distribution of both the grades indicates that rural and urban pupils are more or less similarly distributed.

Table 93: Band distribution in mathematics by Location

Grade	Location	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	Rural	15%	25%	33%	22%	5%
	Urban	15%	34%	33%	15%	3%
Grade 5	Rural	1%	9%	29%	34%	27%
	Urban	1%	12%	35%	34%	18%

In Grade 3, nearly 27 per cent rural pupils performed in Bands 4 and 5 compared with 18 per cent urban pupils. In Grade 5 nearly 27 per cent rural pupils performed in bands 5 level but only 19 per cent urban pupils performed at this level.

4.7 Mathematics achievement by Division

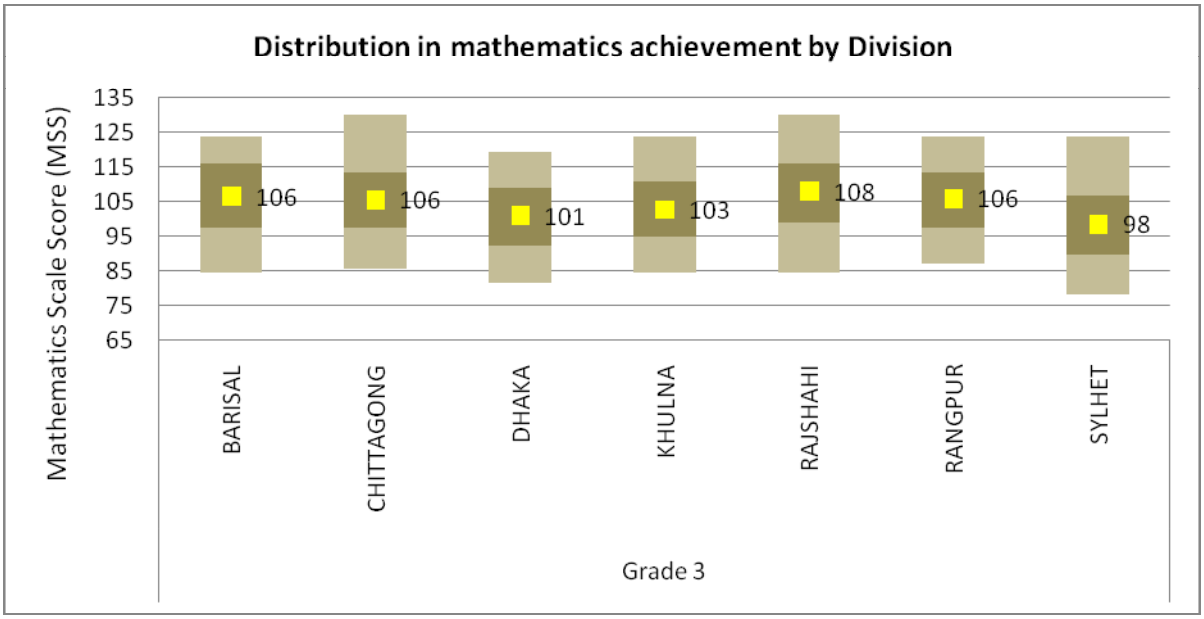
Table 104: Mathematics achievement by Division

Division	Grade 3			Grade 5		
	Number of Pupils	Mean(MSS)	Std. Deviation	Number of Pupils	Mean(MSS)	Std. Deviation
BARISAL	1458	106.4	12.8	1115	119.6	12.6
CHITTAGONG	4968	105.5	12.6	3927	117.2	12.4
DHAKA	6881	100.9	12.3	5123	114.4	11.9
KHULNA	2432	102.7	11.8	2030	115.5	11.3
RAJSHAHI	2791	107.9	14.5	2171	118.3	12.7
RANGPUR	2607	105.9	11.5	2054	115.4	12.4
SYLHET	1927	98.4	13.2	1386	111.0	13.1
Total	23064	103.7	13.0	17806	115.8	12.4

In Grade 3, the average scale score of pupils in Rajshahi was the highest in mathematics (108 MSS), while the average scale score in Sylhet was the lowest (98 MSS). The difference as per the effect size is medium between Rajshahi and Shylhet Barisal and Sylhet, Sylhet and Rangpur and Rajshahi and Dhaka. The differences among other divisions are considered small.

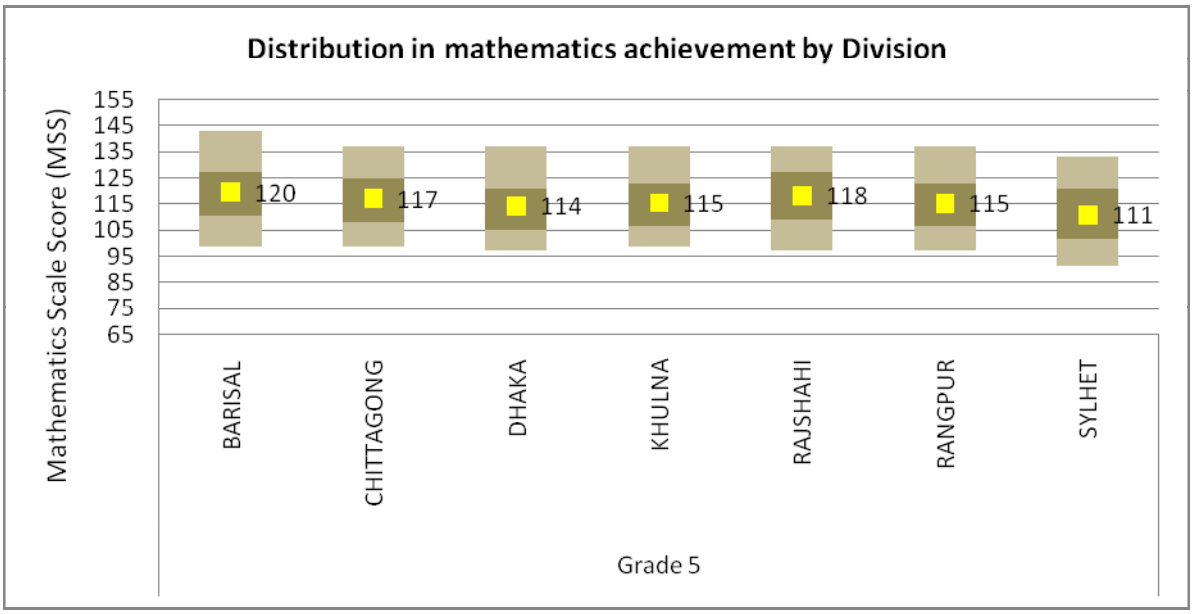
In Grade 5, the average scale score of pupils in Barisal was the highest in mathematics (120 MSS), while the average scale score in Sylhet was the lowest (111 MSS). The difference as per the effect size is large between Sylhet and Barisal. The difference is medium between Rajshahi and Shylhet, Chittagong and Dhaka and Barisal. The differences among other divisions are considered small in terms of statistical singnificance.

Figure 23: Grade 3 mathematics distribution by Division



For Grade 3, the mathematics performance distribution in Rangpur division has the lowest range and Rajshahi has the highest range compared to the other divisions.

Figure 24: Grade 5 mathematics distribution by Division



For Grade 5, Barisal division has the widest performance range.

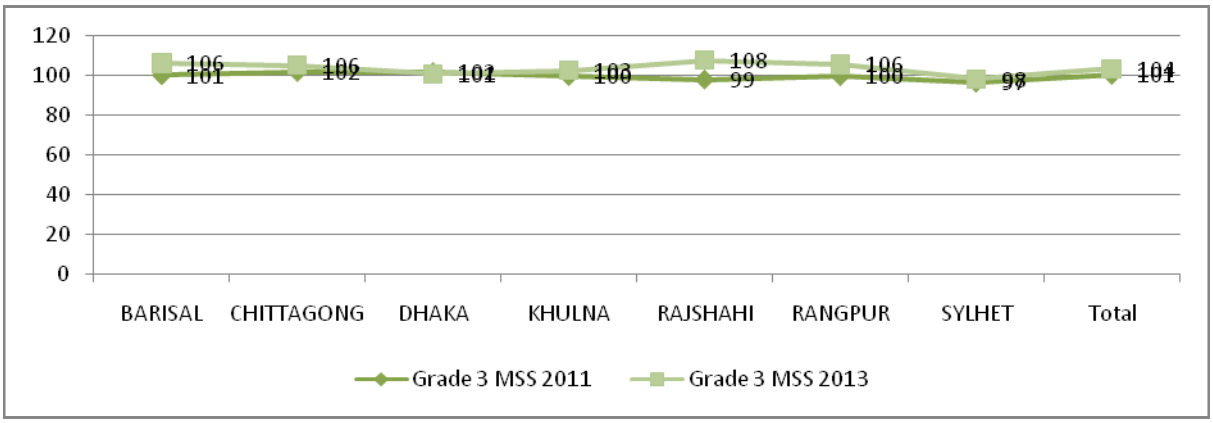
Table 25: Band distribution in mathematics by Division

Grade	Division	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	BARISAL	11%	24%	29%	32%	4%
	CHITTAGO	10%	26%	36%	23%	5%
	DHAKA	19%	32%	32%	15%	2%
	KHULNA	15%	31%	34%	17%	3%
	RAJSHAHI	11%	21%	32%	26%	10%
	RANGPUR	9%	25%	36%	26%	3%
	SYLHET	28%	33%	25%	11%	4%
Grade 5	BARISAL	1%	7%	22%	36%	35%
	CHITTAGO	1%	8%	29%	34%	28%
	DHAKA	1%	11%	34%	35%	19%
	KHULNA	1%	8%	33%	36%	22%
	RAJSHAHI	1%	8%	24%	33%	35%
	RANGPUR	1%	11%	31%	33%	25%
	SYLHET	4%	20%	32%	30%	15%

The highest performing divisions in mathematics in both grades were Barisal and Rajshahi with 36 per cent of Grade 3 and 68-71 per cent of Grade 5 pupils achieving at bands 4 and 5. Sylhet had a high percentage (28 per cent) of Grade 3 pupils at band 1.This compares with 15 per cent of pupils in band 1 at the national level in Grade 3 (Table No.17). Ten per cent of Grade 3 pupils from Rajshahi, highest among the divisions, reached band 5 level.

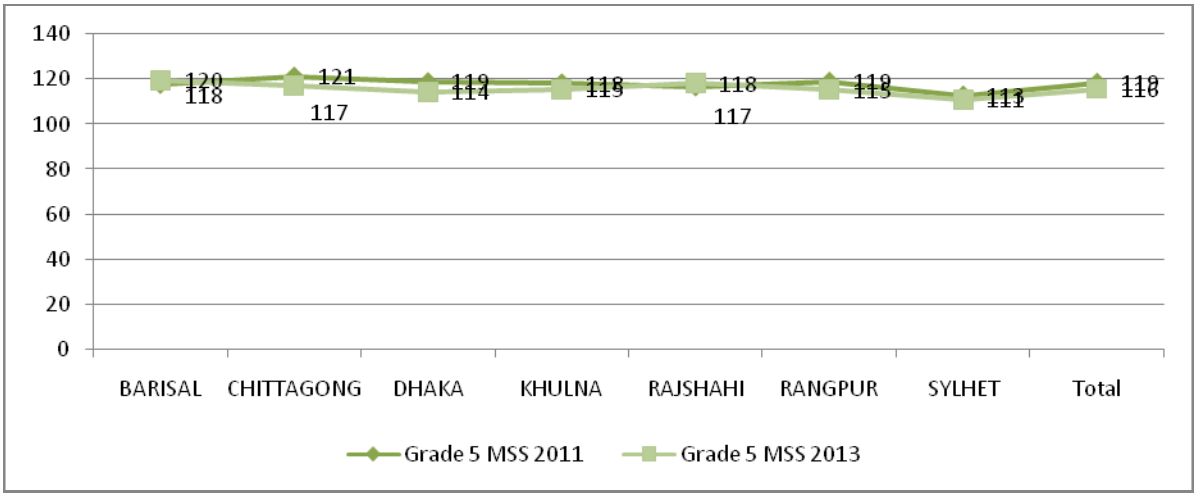
Patterns of strength and weakness by division in Grade 5 are similar to those of Grade 3; Barisal and Rajshahi have 35 per cent of pupils achieving in Band 5 while Sylhet results show 56 per cent of pupils attaining no better than Band 3.

Figure 25: Change in Grade 3 mathematics achievement by Division during 2011 and 2013



Between 2011 and 2013, Rajshahi and Rangpur divisions have shown 9 and 6 score point improvement in the MSS for Grade 3 respectively. In the remaining divisions, mathematics achievement nearly remained the same during both 2011 and 2013 cycles.

Figure 26: Change in Grade 5 mathematics achievement by Division during 2011 and 2013



Between 2011 and 2013, Grade 5 mathematics achievement nearly remained same for all the divisions.

4.8 Mathematics achievement by School Type

Table 26: Mathematics achievement by School type

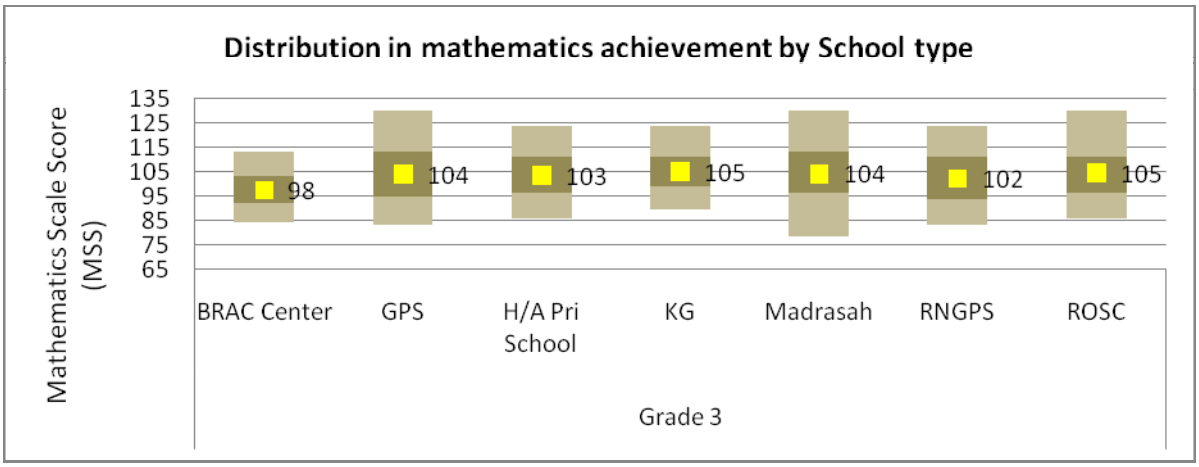
School Type	Grade 3			Grade 5		
	Number of Pupils	Mean(MSS)	Std. Deviation	Number of Pupils	Mean(MSS)	Std. Deviation
BRAC Center	414	97.5	8.8	944	110.2	7.8
GPS	13454	104.1	13.6	10620	117.2	13.1
H/A Pri School	891	103.4	11.4	710	112.8	11.7
KG	1486	105.0	9.9	1187	116.8	11.1
Madrasah	1078	104.2	14.5	932	112.7	11.2

RNGPS	4662	102.3	12.0	3413	113.9	11.3
ROSC	1079	104.6	12.5	-	-	-
Total	23064	103.7	13.0	17806	115.8	12.4

In Grade 3, the average scale score of pupils in KG schools was the highest in mathematics (105 MSS), while the average scale score in BRAC centre was the lowest (97.5 MSS). There was a medium to large difference in mathematics scale score between BRAC centre and KG schools, BRAC and Madrasah and BRAC and GP schools.

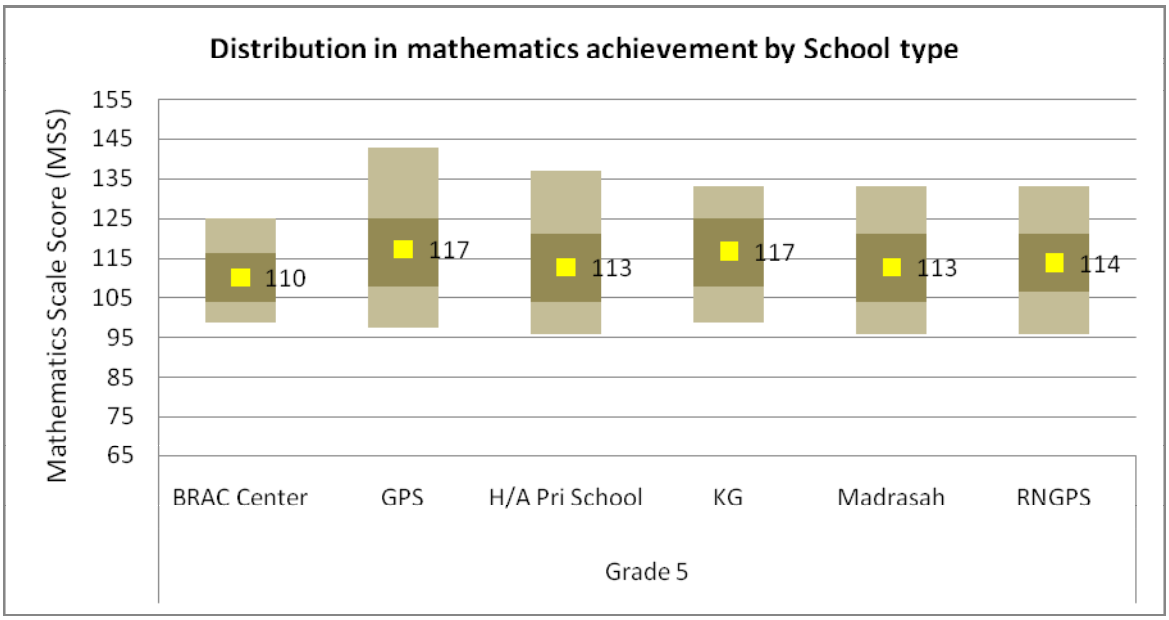
In Grade 5, the average scale score of pupils in GP schools was the highest in mathematics (117.2 MSS), while the average scale score in BRAC centre was the lowest (110.2 MSS). There was a medium to large difference in mathematics scale score between BRAC and GPS and BRAC and KG schools.

Figure 27: Grade 3 distribution of mathematics achievement by School type



In Grade 3, the performance distribution in BRAC centre was the narrowest and Madrasah has the widest range. This shows a narrow gap between the strongest and the weakest students in BRAC schools and a wide gap between the strongest and the weakest students in Madrasah schools.

Figure 28: Grade 5 distribution in mathematics achievement by School type



In Grade 5, the performance distribution in BRAC centre was the narrowest while GPS has the widest range. This shows a narrow gap between the strongest and the weakest students in BRAC schools and the GPS distribution reveals that the top 20 per cent students in these schools are performing more strongly than the top 20 per cent in other districts.

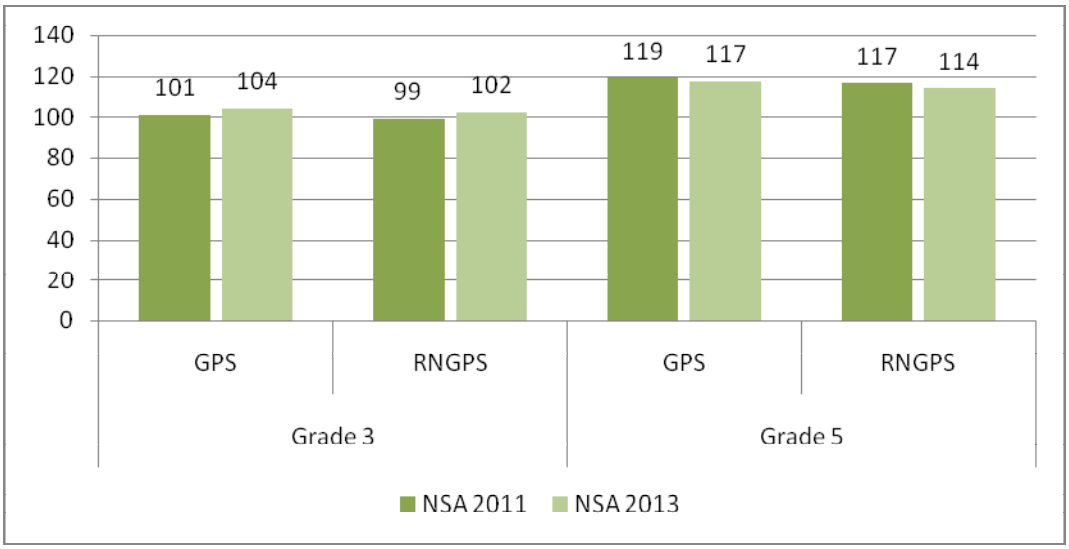
Table 27: Band distribution in mathematics by School type

Grade	School Typ	Band 1	Band 2	Band 3	Band 4	Band 5
Grade 3	BRAC	19%	51%	23%	7%	
	GPS	15%	27%	31%	21%	6%
	H/A Pri	11%	32%	36%	18%	2%
	KG	6%	29%	43%	19%	2%
	Madrasah	15%	25%	32%	22%	6%
	RNGPS	16%	29%	33%	20%	2%
	ROSC	12%	27%	37%	19%	5%
Grade 5	BRAC		10%	51%	34%	5%
	GPS	1%	9%	27%	34%	29%
	H/A Pri	2%	14%	35%	32%	17%
	KG	0%	7%	29%	36%	28%
	Madrasah	1%	13%	38%	30%	18%
	RNGPS	1%	11%	34%	34%	20%

Nearly 28 per cent of Grade 3 pupils performed at band 4 and 5 levels in Madrasah compared with 7 per cent in BRAC centres. Conversely, 6 per cent of Grade 3 KG pupils performed at band 1 compared with 19 per cent from BRAC centres.

Nearly 63 to 64 per cent of Grade 5 pupils performed at band 4 and 5 levels in GP and KG schools compared with 39 per cent in BRAC centre.

Figure 29: Change in mathematics achievement by School type during 2011 and 2013



In 2011 the data were disaggregated only to GPS and RNGPS. Comparison between 2011 and 2013 can therefore only be made for these school types. In Grade 3, mathematics scale score improved marginally for both GP and RNGP schools however for Grade 5 the mathematics achievement decreased marginally for both type of schools.

Chapter 5

School Environment and Students' Performance

5.1 School Environment and Students' Performance

The first set of detailed analysis on the student's learning outcomes is focused on school characteristics and environment. In Bangladesh, there are 13 different types of schools that provide primary education. NSA 2013 covered 7 types of schools, including Government Primary Schools (GPS) and Registered Non-Government Primary Schools (RNGPS), Madrasas, Kindergartens, high school attached primary schools, BRAC schools, and ROSC schools. NSA 2011 covered GPS and RNGPS only, so this is an expansion of sampling coverage. According to Annual School Census of 2012, GPS and RNGPS enroll about 78 percent of students in primary education, and other five types of schools including for this sample covers additional 14 percent. Thus, this NSA 2013 covers 92 percent of student population in Bangladesh. Remaining 8 percent of students are found in 6 different types of schools, including Experimental schools, Community schools, Non-registered non-government primary schools, high madrasah attached madrasah, NGO schools, and Shishu Kollyan (DPE 2013)[10].

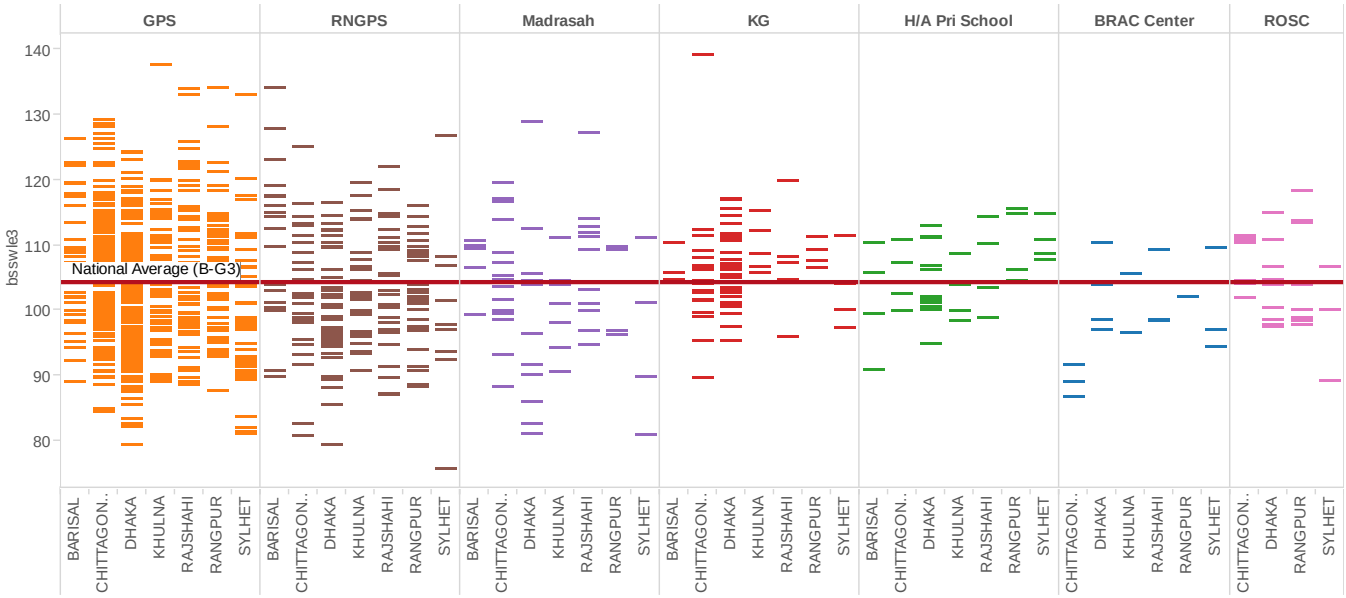
5.2 There is a large performance difference across schools

Figure 30 and Figure31 present the distribution of average performance by schools in Grade 3 Bangla and math, respectively. In grade 3 Bangla, there is a huge difference within GPS schools within the same division. For example, in Khulna division, the highest performance is close to 140

[10] There are also "other" categories of schools which are not specified with their exact names.

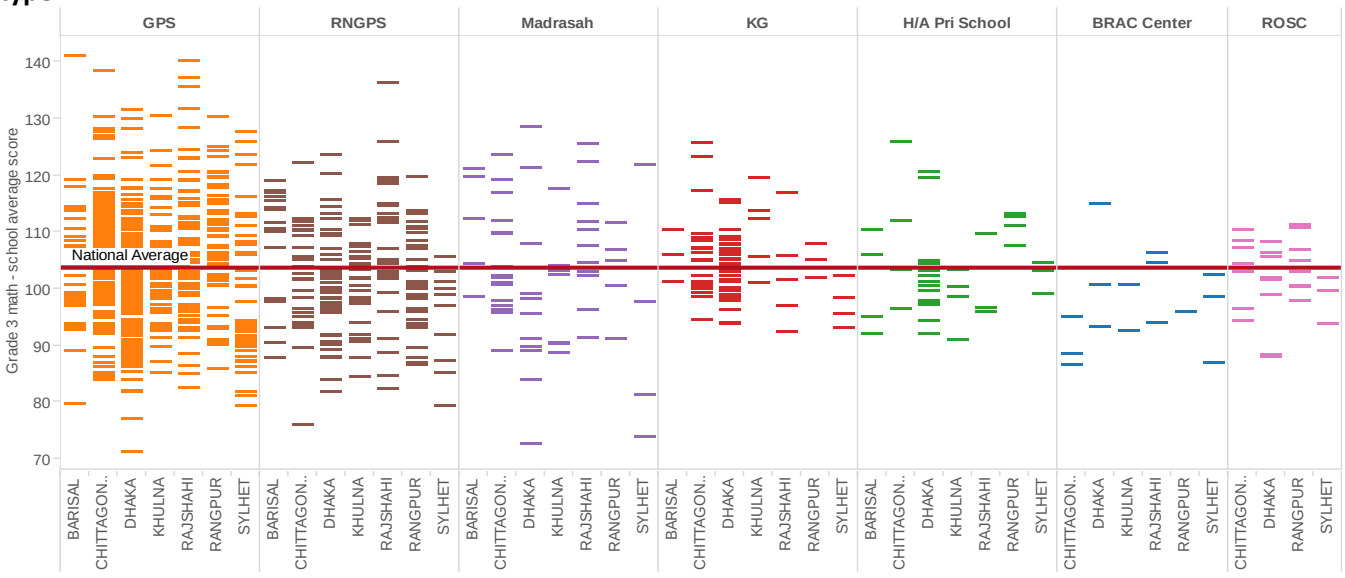
points whereas the lowest performing school average is around 90 points. The difference is equivalent to 5 times the standard deviation.

Figure 30: Distribution of Grade 3 Bangla school average scores by division and school type



Source: Author's analysis using NSA 2013

Figure31: Distribution of Grade 3 Math school average scores by division and school type



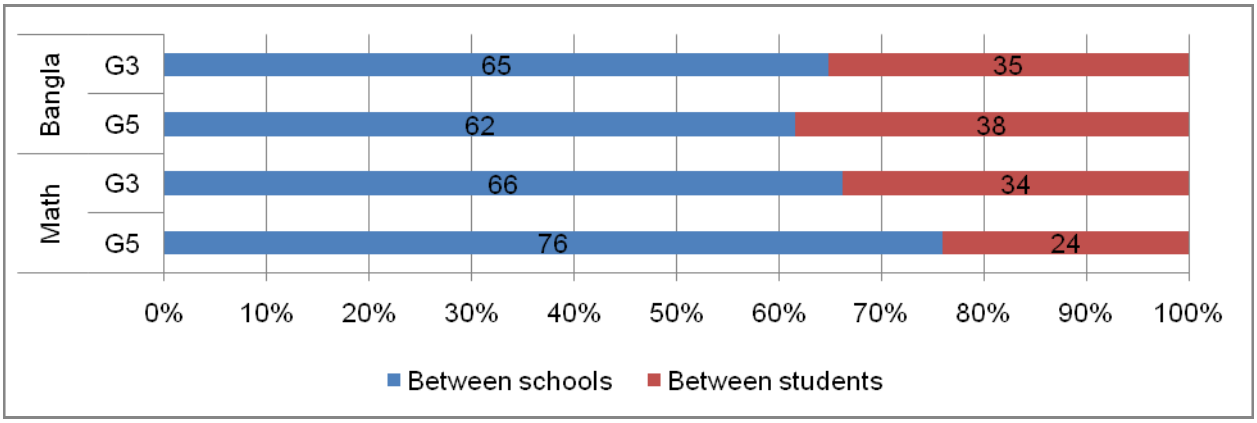
Source: Author's analysis using NSA 2013

5.3 School related factors account for 70 percent of performance inequalities

An important policy question is where academic performance gap exists. An analysis of intra-cluster correlation shows that a larger variance of test scores exist between schools rather than between students, leading to an interpretation that there is a wider difference between good schools and

weak schools performance within each of the school is not very large. In grade 3 Bangla, school level factors account for 65% of score differences while student level factors account for 35%. In grade 3 Mathematics, schools factors account for 62% of variance while individual factors account for 38%. Similarly in grade5, school factors account for 66% in Bangla and 76% in Mathematics whereas student factors account for 34% and 24% of variations. Generally, the across school inequalities are larger than NSA 2011, but this is most likely because of the different sampling framework, with an addition of 5 new types of schools to the sample.

Figure 32: Between-school and between-student score variation in NSA 2013



Source: Author's analysis using NSA 2013

This result has a few possible explanations. First, school and teacher quality determines students' learning. A simple explanation for a large performance difference across different schools is that weakly performed schools have relatively poor school management and teacher quality. Under this assumption, better performing schools have good school management and good quality of teachers; therefore, quality improvement of teachers and school management is the key to encounter this problem. Second, it is also a possibility that poor performing schools are located in areas where poor students and less educated parents live. For example, all students are equally poor in a school and hence the average performance of students in this school is lower than a school where all students are relatively wealthy. Under this assumption, performance gaps largely exist between schools but they are originated from household characteristics.

Between-school variation in Bangladesh is relatively high in an international comparison, and quality standard varies from a school to another in Bangladesh. Although Bangladeshi NSA is not for international comparison, it is important to understand what 62% between-school variation means. Although the purpose is only indicative,

Figure displays other countries' between-school variations in reading comprehension estimated from PIRLS 2000 at grade 4 or 5 in comparison with between-school variation estimated from NSA grade 5 Bangla. While the sample contains relatively developed countries, the trend shows that a as country system is developed, the between-school variances tend to shrink and ranges between 10 to 30%, students factors (within school, between-students) tend to be more important. This is likely due to equalization of teacher and school management quality across primary schools when school systems are developed. In this regard, 62% between-school variation in Bangladesh is relatively high and quality standard still varies from a school to another in Bangladesh.

Figure 33: Relationship between GNI per capita and Between-school variations reading comprehension

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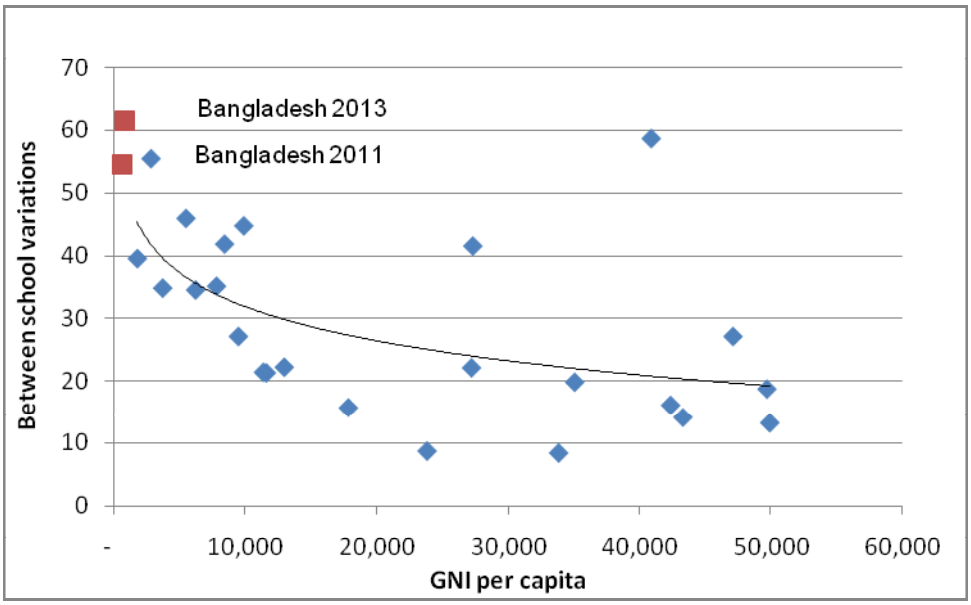
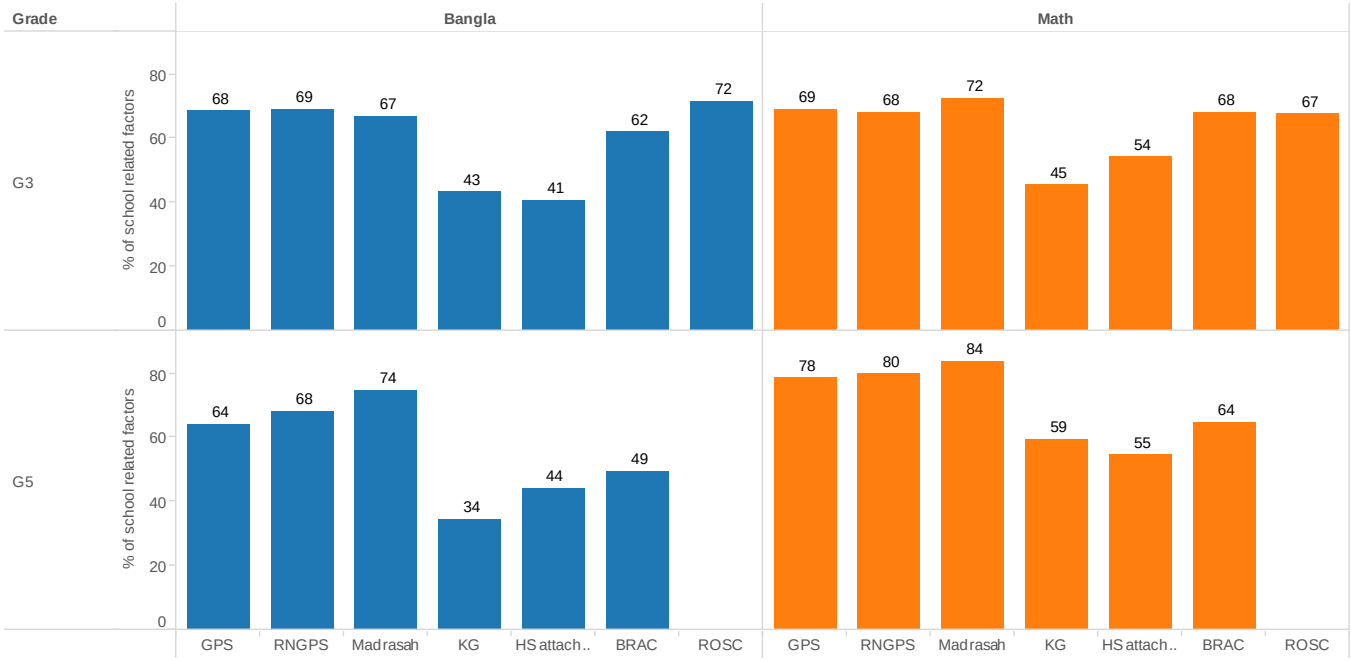


Source: Author's analysis using NSA 2011, NSA 2013, and PIRLS 2000 as cited by World Bank 2004.

Note: NSA 2013 data includes 7 types of schools while NSA 2011 includes only 2 types of schools.

Performance inequalities within the same type of schools is smallest among kindergarten and high-school attached schools and largest among madrasahs. Following the overall picture of school versus student related factors for performance inequalities, inequalities within the same school type is also analyzed. The result shows that an inequality across schools is relatively small in kindergarten and high school attached schools. In case of Bangla grade 5, only 34 percent of inequalities is due to school factors in kindergarten. This implies that the school standards are set and enforced across kindergartens and there is not much difference about which kindergarten a child goes to. The same interpretation is also applicable to high school attached primary schools. On the other hand, the quality standard across school varies more widely among madrasahs, followed by RNGPS and GPS. In these schools, which school to go to matters, and students in the same school are performing more or less similar.

Figure 34: Percentage of performance inequalities attributed to school related factors, by school type

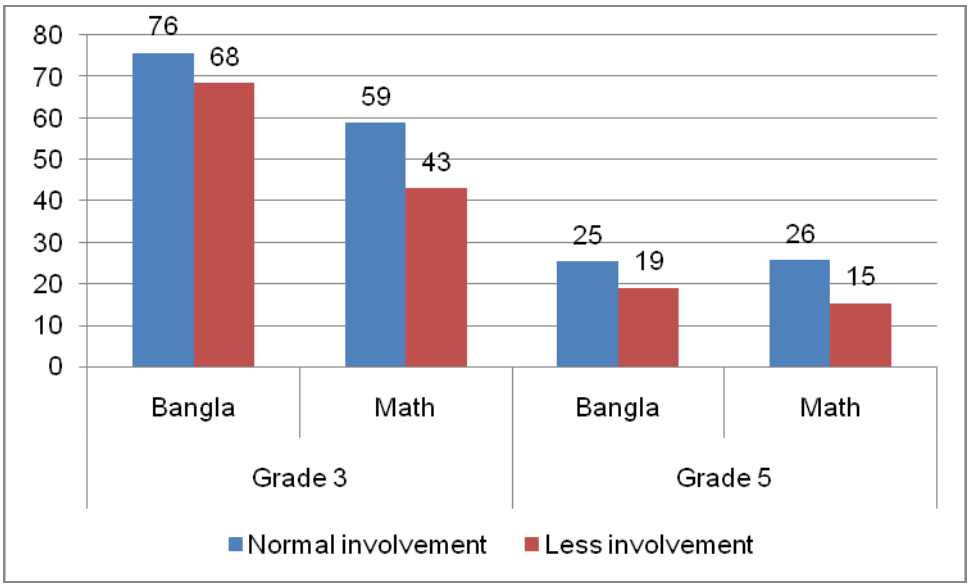


Source: Author's analysis using NSA 2013

One of the important implications from the analysis of variance is that interventions should target schools rather than individuals. Policy implication of this finding is very important for targeting. To overcome a fiscal resource constraint, targeting is always a major concern of the policy makers. From this finding, targeting can be more efficiently done at school levels than at individual levels. Since a larger score variance exist between-schools rather than between-individuals, it is fair to consider that students in schools are more or less at the similar level of achievement. Therefore, instead of trying to identify weak students in a school, target weak schools and include all students within the schools make more sense in terms of feasibility and efficiency of targeting. It is important to identify weakly performing schools and top performing schools and identify what are the factors that contribute to the differences in performance.

Head teacher's leadership and involvement greatly matters to the performance of students. Figurepresents the proportion of students who meet relevant competency level in grade 3 and grade 5 in Bangla and Math, by head teacher's level of engagement to school activities. Out of 994 schools that completed questionnaires, head teachers of 107 schools appear to be relatively less involved in school activities. These less involved teachers say that they don't do much of the following activities due to lack of time: classroom observation, provision of advice to teachers, and preparation of annual work plan for the school, and self-studying for professional improvement. The average performance of these schools is lower than other schools with statistically significant difference. For example, while the average proportion of students meeting grade 3 math is 59 percent, it is only 43 percent (16 percentage point lower) among the schools with less engaged head teachers. This clearly tells the importance of leadership and the engagement of head teachers in school activities.

Figure 35: Percentage of students achieving relevant competencies, by head teachers' engagement



Source: Author's analysis using NSA 2013

Schools that promote teachers' knowledge exchange show higher performance. Table shows the difference in performance between schools that promote teachers' exchange of knowledge and do not exchange of knowledge. The result shows a clear trend – for those that do not practice. While the 75 percent of students meet competency standard of grade 3 Bangla in schools that promote teachers' knowledge and experience sharing, the proportion is only 67 percent among schools that do not promote exchange. In grade 3 Math, the gap is wider i.e. 58 percent against 47 percent.

Table 28: Percentage of students achieving relevant competencies, by teacher and head teacher's engagement

Grade	Subject	Teacher exchange views	Total	*Normal involvement*	*Less involvement*
Grade 3	Bangla	Yes	75.4	*75.8*	*70.9*
		No	67.4	*72.6*	*59.7*
	Math	Yes	58.0	*59.1*	*45.8*
		No	46.9	*53.8*	*36.8*
Grade 5	Bangla	Yes	25.6	*26.0*	*21.0*
		No	15.5	*16.6*	*13.7*
	Math	Yes	25.4	*26.2*	*16.9*
		No	17.4	*21.5*	*11.1*

Source: Author's analysis using NSA 2013

The above table shows that the teacher's active exchange of knowledge and experience improves students' learning. In order to further investigate the trend of students' performance by level of academic of teachers and head teachers, additional two columns are presented in Table . Even among schools that do not promote teachers exchange, as long as head teachers are closely engaged with academic matters, the performance is not so bad – it is 73 percent in case of grade 3 Bangla and 54 percent in grade 3 math. On the other hand, if teachers don't interact one another and head teachers are not engaged either, the performance is substantially lower than the rest. The proportion of students achieving grade 3 competencies in Bangla and math are 60 percent and 37 percent, respectively.

Chapter 6

Teacher Factors and Students' Performance

6.1 Teacher Factors and Students' Performance

Teachers are central to teaching and learning practices, and parents, teachers, and administrators emphasize repeatedly the fundamental role that teachers play in the determination of school quality. The NSA 2013 aims to see some linkages between students' performance and teacher characteristics, and it also asks some questions about teaching practices and teacher motivations. However, one caveat for linking students' performance and teachers' characteristics by using the data from NSA is that the statistics provides only a contemporaneous snapshot for a particular year while learning happens in cumulative manner. Performance of Grade 5 students, for example, are already influenced by different (sometimes the same) teachers from Grade 1 to 4. Therefore, it is difficult to attribute the performance differences to Grade 5 teachers only. However, considering that students spend at least a full academic year with a particular teacher (during academic year 2013), this analysis assumes that teachers had some influences on students' performance. In NSA 2013, 3,110 teachers from 7 types of schools, who teach in grades 3 and/or 5, were surveyed.

Table 29: Number of teachers surveyed in each type of school, by gender

	Male	Female	All	% of female teachers
GPS	591	1,261	1,852	68.1%
RNGPS	296	281	577	48.7%
Madrasah	138	42	180	23.3%
KG	107	129	236	54.7%
HS_attached	63	88	151	58.3%
BRAC	2	68	70	97.1%
ROSC	14	30	44	68.2%
Total	1,211	1,899	3,110	61.1%

Source: Authors' analysis using NSA 2013

6.2 Teachers' qualification is somewhat correlated with students learning

Although there is not a sharp pattern of progress, there is a general trend where students who are taught by more educated teachers seem to perform somewhat better. Teachers having only SSC (as

opposed to HSC and above) has a disadvantage in student' performance in grade 3 math and grade 5 Bangla, although the trend is not clearly seen in grade 3 Bangla and grade 5 math. On the other hand, having Master's degree and above (as opposed to Bachelor or below) shows a clearer performance advantage of students.NSA 2011 did not find such a clear difference between teachers of bachelor or master and above, so this is a different pattern.

Table 30: Percentage of students meeting relevant competencies by teacher's qualifications

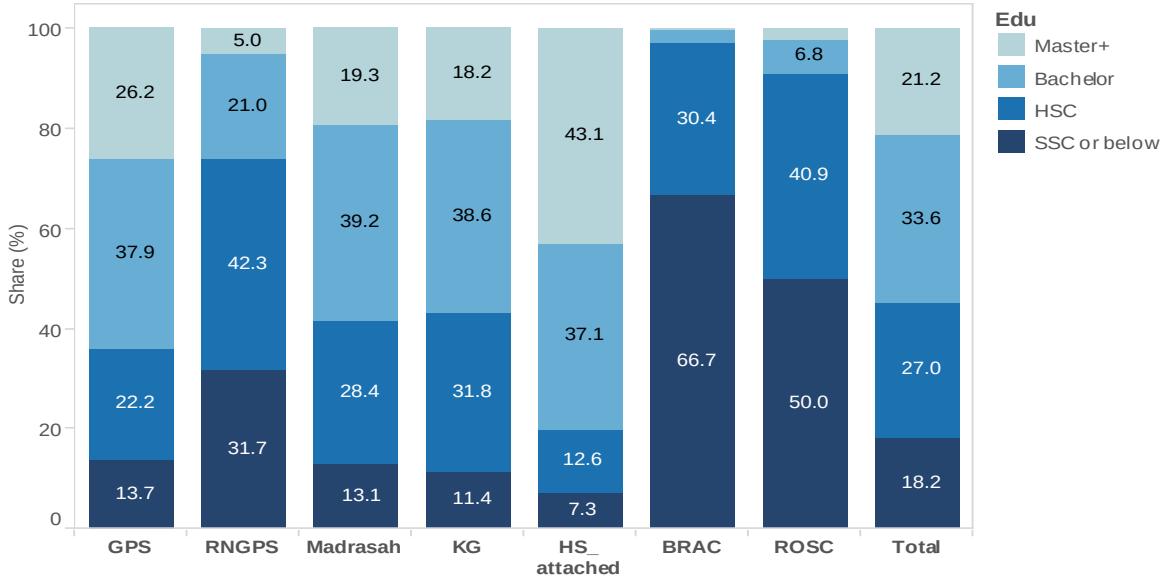
	Grade 3		Grade 5	
	Bangla	Math	Bangla	Math
SSC or below	74.0	52.9	19.3	23.2
HSC	73.4	58.1	25.7	20.8
Graduate	76.2	58.1	25.5	27.6
Master+	77.3	59.2	27.6	26.3

Source: Author's analysis using NSA 2013

6.3 Teachers' qualifications are quite different across school type

Though there may not be a sharp pattern of students' performance, it is important to recognize that there are differences in teachers' qualifications across school types. In high school attached schools, 43 percent of teachers have higher than master's degree while only 7 percent of teachers have less than SSC. On the other hand, 32 percent of teachers in RNGPS have less than SSC qualifications while only 5 percent have higher than master degree. In non-formal schools, the share of teachers with SSC or HSC is particularly high – reaches up to 97 percent in BRAC and 91 percent in ROSC schools.

Figure 36: Share of teachers by qualifications, by school type



Source: Author's analysis using NSA 2013

On the other hand, teacher's years of experience seems exhibit a clear pattern for teachers with more 20 years of experience. Overall, there is no clear trend of performance difference depending on the teachers' years of experience, except for the teachers with more than 20 years of experience. The average proportion of students with meeting standard is lower than teachers with less experience. This finding is consistent with NSA 2011, and it is likely that those teachers who are serving more than 20 years are teaching with old teaching methodologies, generally having lower qualifications, and having less motivation for improving students' performance.

Table31: Percentage of students meeting relevant competencies by teacher's experience

	Grade 3		Grade 5	
	Bangla	Math	Bangla	Math
0-4 years	75.5	59.9	24.8	25.2
5-9 years	77.3	56.3	27.0	26.5
10-19 years	72.4	59.8	25.1	30.3
20 years+	74.3	53.2	23.5	22.6

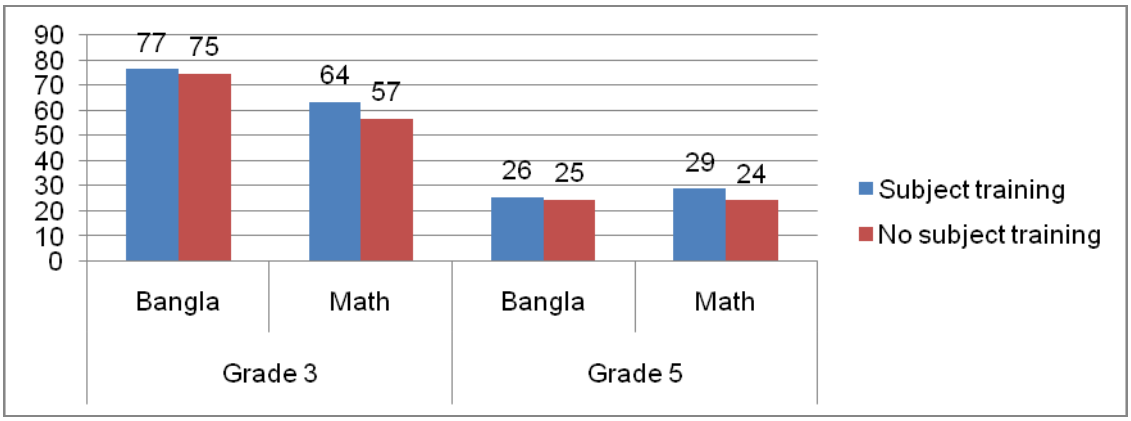
Source: Author's analysis using NSA 2013

6.4 Subject training is correlated with better students' performance

The NSA 2013 results show that subject training is correlated with higher students' performance. **Error! Reference source not found.** shows the percentage of students who achieve relevant competencies by teachers' status of receiving subject training during the last 3 years (2011-2013). In both grades and in both subjects, performance is higher among students who learn from trained teachers. As discovered by World Bank 2013 from a study of secondary school teachers' subject knowledge and students' performance, teachers' subject knowledge is positively correlated with students' performance in Bangladesh. Therefore, it is fair to say that the subject teacher training is effective in improving students' learning outcomes.[11] This finding is consistent with NSA 2011. It should be noted that the subject training does not reach equitably across different types of schools. In GPS and RNGPS, about 6 to 7 percent of teachers received subject training between 2012 and 2013. On the other hand, 72 percent and 53 percent of teachers received subject training in kindergartens and high school attached schools. Most of BRAC and all ROSC school teachers received subject training fairly recently .

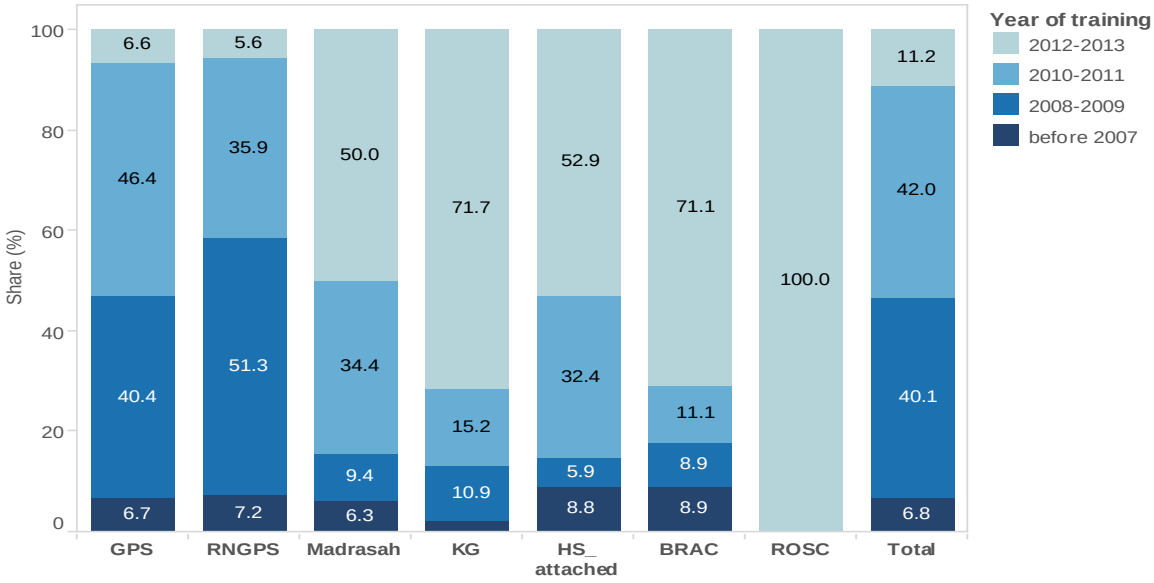
[11] In a more technical discussion, there is a possibility that better performing teachers are invited for training, and if this is the case, there is an opposite direction of causality link.

Figure 37: Percentage of students meeting relevant competencies by teacher's subject training



Source: Author's analysis using NSA 2013

Figure 38: Share of teachers by year of training



Source: Author's analysis using NSA 2013

It is important for curriculum experts and teacher training experts to review if the current training philosophy is correctly understood by teachers. The teacher survey showed a very interesting result – almost everybody GPS said they use materials and foster group work and open discussions, and they rarely ask students to memorize or they rarely lecture students. This can be interpreted in several ways. First, teachers are not responding honestly, but they know what the right answers are according to the training they received. Second, this may be really the situation, and GPS teachers don't lecture at all. Only type of school which showed a different pattern of answers is kindergartens. Teachers from kindergartens said lecture is the most common form of teaching in case of Bangla, and second important method in math. Apparently, kindergartens showed the highest performance in Bangla and math tests in both grades. Therefore, this survey flags an important question to be investigated. Do teachers really understand "why" they are instructed to teach in particular way, or do they have just learned the technique of teaching without understanding the philosophy? If materials are used, without accurately introducing the concepts

through lectures, students may not understand the substances of the subjects. GPS teachers seem to detest lectures and memorization but this may be needed for ensuring certain level of understanding. Making the class attractive for students, by using materials and group work, is an important approach for primary school education; however, it is also important to make sure that the materials used are right aids for making students to understand the basic concept, and students do understand what is being demonstrated

Table 32: Ranking of most commonly used teaching techniques, by school type

	First	Second	Third		Eight	Ninth (Last)
Bangla Teachers						
GPS	Use of materials	Group work	Open discussion		Memorize as per textbook	Lecture
RNGPS	Use of materials	Group work	Open discussion		Using acquired knowledge	Quizzes
Madrasah	Use of materials	Memorize as per textbook	Group work		Increase vocabulary	Quizzes
KG	Lecture	Group work	Use of materials		Individual task	Using acquired knowledge
HS_attached	Use of materials	Group work	Lecture		Individual task	Using acquired knowledge
BRAC	Use of materials	Group work	Increase vocabulary		Individual task	Using acquired knowledge
ROSC	Use of materials	Group work	Memorize as per textbook		Quizzes	Using acquired knowledge
Total	Use of materials	Group work	Open discussion		Using acquired knowledge	Lecture
Math Teachers						
GPS	Use of materials	Group work	Basic rules of mathematics		Lecture	Memorize as per textbook
RNGPS	Use of materials	Group work	Basic rules of mathematics		Using acquired knowledge	Lecture
Madrasah	Use of materials	Group work	Basic rules of mathematics		Lecture	Quizzes
KG	Basic rules of mathematics	Lecture	Use of materials		Individual task	Using acquired knowledge
HS_attached	Use of materials	Group work	Basic rules of mathematics		Individual task	Using acquired knowledge
BRAC	Group work	Use of materials	Basic rules of mathematics		Using acquired knowledge	Lecture
ROSC	Use of materials	Lecture	Group work		Memorize as per textbook	Quizzes
Total	Use of materials	Group work	Basic rules of mathematics		Memorize as per textbook	Lecture

Chapter 7

Students' Performance and Their Household Background

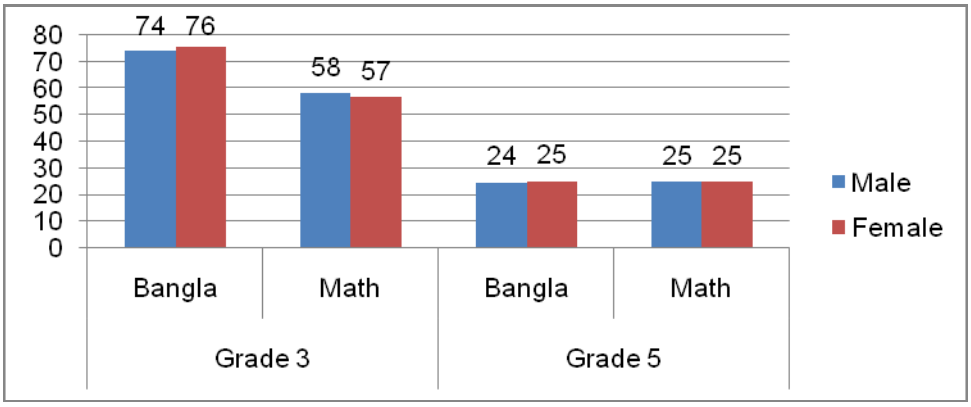
7.1 Students' Performance and Their Household Background

Given the importance of learning and child development outside school, household inputs have long been viewed as a leading input in educational production. As a consequence, consideration of measures of household background is generally taken as the most rudimentary quality standard when analyzing effects of school inputs. However, most student and household characteristics do not have direct causal relationships with students' learning outcome. For example, bringing households out of the poverty line doesn't instantly increase students' learning. Student and household characteristics should be viewed for understanding equality in performance in different social and socioeconomic groups. It is more important to understand common characteristics associated with lower performance and provide tailored and targeted interventions. In this chapter, students' learning by various household and student background characteristics is assessed.

7.2 Personal Characteristics

Minor gender differences are observed but there are practically no differences in performance between genders. The NSA 2013 results show that there are minor statistically significant differences in learning achievement by gender. In Bangla, girls tend to perform marginally better in both grades 3 and 5, and in math, boys tend to perform marginally better. However, there are practically no differences between these two groups in learning outcomes in both grades and in both subjects. This finding is consistent with NSA 2011.

Figure 39: Percentage of students meeting relevant competencies by gender



Source: Author's analysis using NSA 2013

Performance of indigenous groups is much lower than non-indigenous groups in both subjects and in both grades. Based on the statistical comparison, there are stark and statistically significant differences in achievement in Bangla or Mathematics in both grades 3 and 5. The population of indigenous group is small – about 4 percent of students in samples of both grades. Yet, the difference in performance is stark. I grade 5, while one in four students meet grade 5 level competencies in both Bangla and math, one in eight indigenous students meet Bangla competency and one in eleven students meet Math competencies in grade 5.It should be noted that NSA 2011 did not find any statistical difference in performance between indigenous and non-indigenous group students. However, in NSA 2011, such information was collected through a sub-sample of parents

through household questionnaires whereas in NSA 2013, all students were asked for basic questionnaires about themselves. If sampling explains the difference, this NSA 2013 seems to more accurate situation than in NSA 2011.

Table 33: Percentage of students meeting relevant competencies by indigenous and non-indigenous groups

	Grade 3			Grade 5		
	Bangla	Math	N	Bangla	Math	N
Indigenous	57.1	40.2	764	13.9	8.5	589
Non-Indigenous	75.2	57.7	19,059	24.8	25.6	14,759

Source: Author's analysis using NSA 2013

7.3 Attitude towards Learning

Absenteeism is correlated with lower performance. During the 10 months period between January and October 2013, 98 percent of grade 3 and 96 percent of grade 5 students were absent from school for at least one day. 40% of and 35% of students in fact were absent from school for more than 10 days. The learning outcomes show that there is a clear correlation between the number of absence and the learning outcomes. In grade 5, among the students who were never absent from school this year, 40 percent met the competency standard in Bangla, while only 26 percent met the standard among students who were absent for 1-4 days, and further going down to 20 percent among students who are absent more than 11 days. While this self-reported information by students may not provide an exactly accurate number for 10 months of absence, the trends is consistent with NSA 2011. Seeing a correlation between the experience of repetition and number of days absent from school, prevention of absenteeism from school is very important action that schools should take for improving students' understanding and preventing repetition. Teachers need to understand that absenteeism and repetition are early signs of a student's low understanding and those students need to be take with special attention.

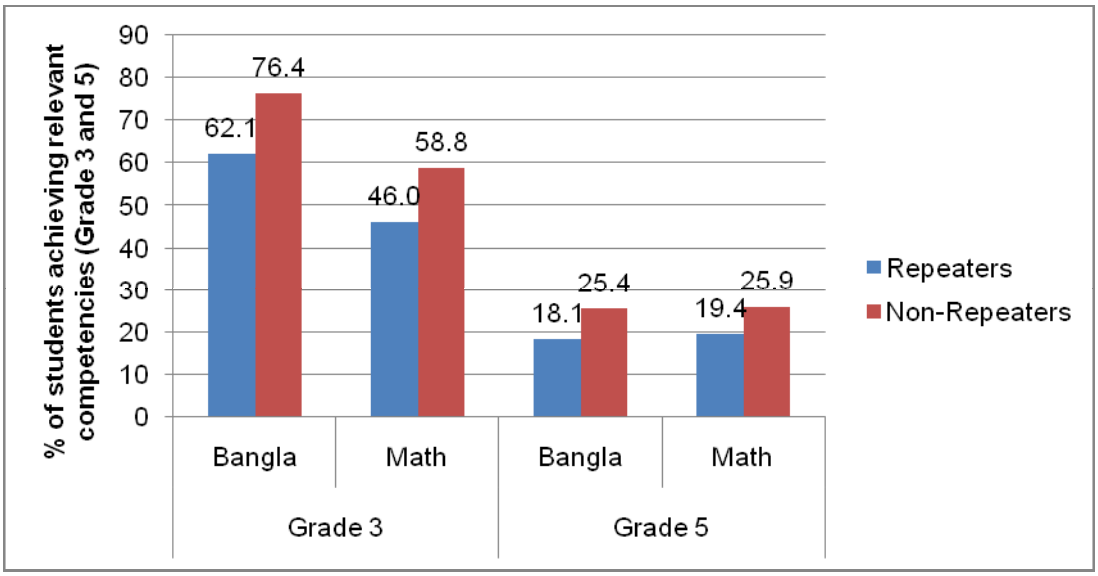
Table 34: Percentage of students meeting relevant competencies by number of absent days in a month

	Grade 3			Grade 5		
	Bangla	Math	N	Bangla	Math	N
No absence	71.2	62.0	309	40.0	38.5	472
1-5 days	77.4	61.1	5,713	26.3	26.4	5,027
6-10 days	76.5	59.7	4,289	23.5	25.9	3,051
11-20 days	72.4	55.7	4,219	20.1	24.5	3,075
More than 20 days	67.9	46.2	2,555	18.7	19.0	1,619

Source: Author's analysis using NSA 2013

Students who repeated a grade perform generally low. In accordance with international literature and findings from NSA 2011, students who have an experience of repeating a grade perform generally low despite the fact that they have a chance to review the same curriculum. Respectively 14% of grade 3 and grade 5 students reported their experiences of repeating at least (any) one grade. Their performance is lower than non-repeaters in both Bangla and Mathematics in both grades 3 and 5, and the difference is statistically significant. The performance gap seems wider in grade3 than in grade5, alluding to a risk of that a repeater of lower grades has a higher risk of not understanding the subject matter. This finding suggests that a special attention is required for students who ever repeat a grade, especially at lower grades.

Figure 30: Percentage of students meeting relevant competencies by repeaters and non-repeaters



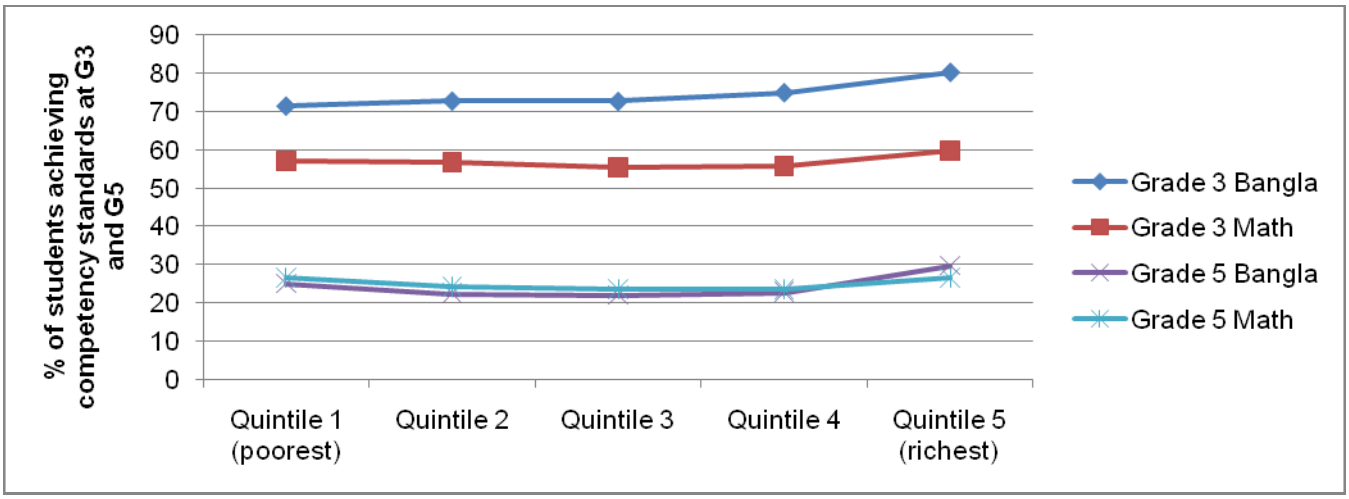
Source: Author's analysis using NSA 2013

7.4 Household Environment for Study Support

While students from richer household back ground tend to do better, the NSA 2013 didn't capture as salient differences as NSA 2011. This could be partly because the information is collected by students' self-reporting as opposed to household surveys. Students were asked to report on their household assets, and based on the availability of household assets and parental occupations; a proxy wealth index was created.[12] The wealth quintile has been created based on this wealth index. NSA 2011 discovered that students from richer household generally perform better in both Bangla and Mathematics than students from relatively poor households. World Bank (2013) estimated that the performance difference between the rich and the poor is about three-quarters of a school year. Considering the difference in the way of collecting household information from NSA 2011, this result needs to be interpreted with a caution and it is too soon to judge performance gap shrank across different wealth group.

[12] The method follows the same formula used as Proxy Means Testing (PMT) method invented for poverty targeted stipend scheme under secondary education. The weights on different household assets is calculated based on the HIES 2010. The variables used for calculating the index are: number of rooms, safe drinking water, sanitary latrine, electricity, TV, mobile phone, bicycle, motorcycle, construction material of house, parental occupation, and parental education level.

Figure 41: Percentage of students meeting relevant competencies by wealth quintile



Source: Author's analysis using NSA 2013

There is no evidence of low performance associated with children's work. The NSA 2013 shows that 87% of grade 3 and 91% of grade 5 students do help family with some kind of household work. The results suggest that there are no statistically significant and consistent differences in the performance due to engagement in household work. The questionnaire did not ask the type of work or number of working hours, so there may be some drawbacks with certain type of child work or long working hours. [13] This finding is consistent with NSA 2011.

Table 35: Percentage of students meeting relevant competencies by children's working status within household

	Grade 3			Grade 5		
	Bangla	Math	N	Bangla	Math	N
Household work	75.1	57.6	17,239	24.4	24.7	13,987
No household work	70.5	53.3	2,584	24.2	27.4	1,361

Source: Author's analysis using NSA 2013

Household support seems to be associated with higher students' performance. Approximately 3 in 4 students receive parental support at home on their learning in both grades 3 and 5.[14] There seems consistent and statistically significant differences in performance between children who receive support from parents and who do not. Parental support may be observed only if parents are educated, and in such a case, parental education matters for household support; however, this finding shows supporting environment at home somehow affects positively in students' learning outcomes.

[13] This question was asked to students, so there may be a compliance effect to the questionnaire, and students may have reported themselves as good children at home. In NSA 2011, about 60 percent of parents said that their children are helping with home chores (but this may be subject to their compliance effect that they are not asking children to do any work).

[14] NSA 2013 did not ask the question about private tutoring.

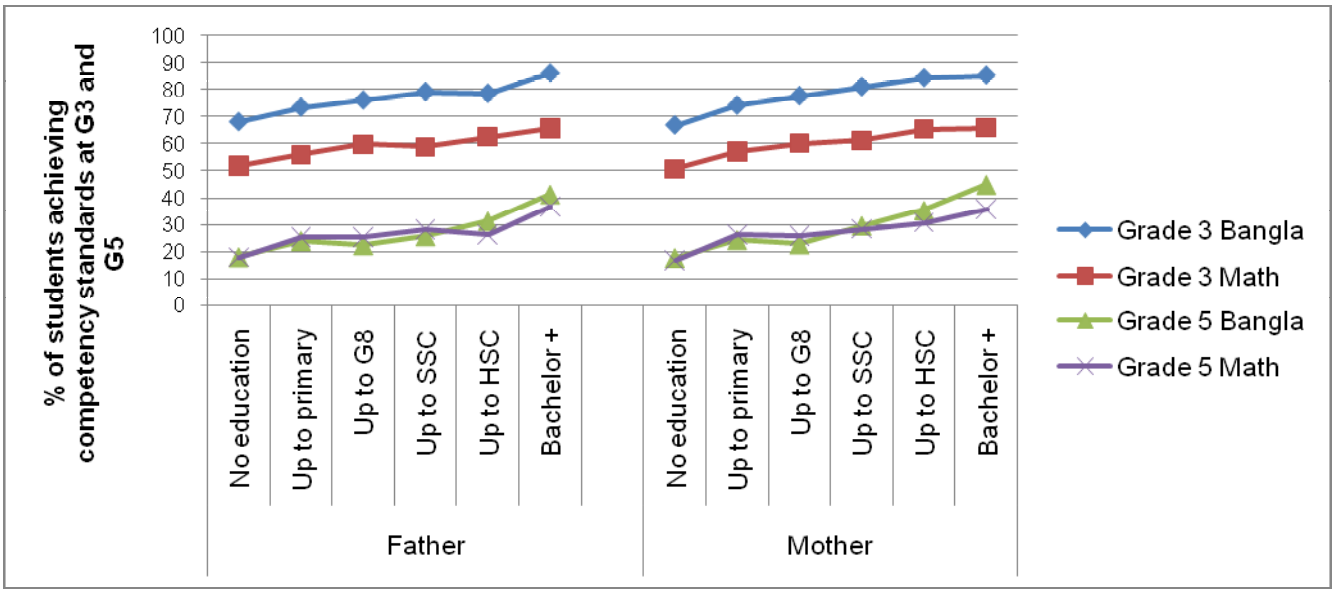
Table 36: Percentage of students meeting relevant competencies by receiving or not receiving parental support in learning

	Grade 3			Grade 5		
	Bangla	Math	N	Bangla	Math	N
Parental Help	75.5	58.1	14,978	25.7	26.7	11,184
No Parental Help	71.3	53.8	4,845	20.8	20.4	4,164

Source: Author's analysis using NSA 2013

Parents' educational level has a positive correlation with children's performance. Among all household background variables, level of parents' education has one of the largest impacts on children's achievement. The differences are particularly prominent towards positive direction among parents with more than bachelor degrees, and towards negative direction among parents without education. Parental education is usually associated with a lot of household background characteristics, such as parental occupation, wealth, household support on education, tutoring, lower repetition rate, less absence, and so on. Although not are all these factors directly correlated with students' achievement, it is clear that parental education is associated with more parental awareness of and engagement in children's learning and seeking for wider options for creating a better environment for children to study. In other words, educated parents are better at understanding what kind of support each child may need to enhance his or her learning and providing needed support (or not supporting if unnecessary). From the policy maker's perspective, this is one effective criterion to target most needy students – the students of uneducated parents are at risk of not learning. This information is easily collectable, so it can be considered as one of the criteria if some kind of targeted intervention is planned.

Figure 42: Percentage of students meeting relevant competencies by parents' educational status



Source: Author's analysis using NSA 2013

Chapter 8

Pedagogical Analysis of What Students Don't Understand

8.1 Pedagogical Analysis of What Students Don't Understand

8.1.1 What students can do?

Valuable diagnostic information can be interpreted from the NSA data for effective use at various levels of the teaching-learning processes by teachers, curriculum developers and policy makers. There is wide variation in performance between students at both Grade levels. This indicates that the students are at different stages in the learning. Teachers will need to account for this whilst designing classroom teaching strategies. A few interpretations that teachers may find useful are provided below, however it is recommended that NCTB and DPE should more deeply analyse each item and identify the errors and misconceptions that students have:

8.1.2 Bangla

Pupils show a strong ability to read and comprehend short texts in Bangla containing challenging ideas. More than half the students show the ability to identify main ideas, themes and make inferences. However, it was noticeable that pupils found it difficult to interpret short, simple poems. This was found to be the single highest ranked skill on the test. Further, pupils found making inferences challenging, when obvious clues were not present. They found it difficult to infer from implicit information. In general, students can retrieve directly-stated information but find it more difficult to recognise nuances or draw inference. Teaching students how to infer and interpret more subtle texts, particularly poems, should be considered a priority. It is important to ensure that student's levels of achievement are accurately assessed by their teachers and that they are provided with clear guidance on how to progress further.

8.1.3 Example of Bangla Items

তারিখ : ৪ মার্চ, ২০১৩

প্রিয় রত্না,

আজ বাবলির কথা খুব মনে পড়ছে। আমাদের এলাকায় বাবার সরকারি চাকুরির সুবাদে সোমার মতো সেও আমাদের স্কুলে পড়ত। এটি মানিকগঞ্জের একটি স্বনামধন্য স্কুল। বাবলির সাথে আমার বন্ধুত্ব ছিল অনেক গাঢ়। যেকোনো কথাই অনায়াসেই তার সাথে আলাপ করতে পারতাম। তার বাবা গাজীপুরে বদলি হয়ে যাওয়ায় তাকে আমাদের বিদ্যালয় ছেড়ে চলে যেতে হয়েছে। সোমার সাথে প্রতিদিন আমার দেখা ও কথা হয়। বাবলির সাথে মোবাইল ফোনে মাঝে মাঝে কথা হয়। কথায় কথায় সে তার প্রিয় মামার কথাও বলে। সে বলেছে আগামী ছুটিতে তার বাবার সাথে আমাদের এখানে বেড়াতে আসবে। সে আমার সত্যিই খুব ভালো বন্ধু।

ইতি

সালমা

৩৯। বাবলি ও সালমার সম্পর্ক কেমন ছিল ?

ক) বন্ধুত্বের

খ) প্রতিযোগিতার

গ) স্বার্থপরতার

ঘ) ঈর্ষার

This question assessed the students' ability to retrieve information from a persuasive text; it was the easiest question (band 1- over 96 per cent correct). The fact that such a large majority of pupils being able to correctly respond to the item is a good indicator that pupils are able to demonstrate the basic skills of reading.

৩৮। আগামী ছুটিতে বাবলি কোথায় বেড়াবে ?

ক) মানিকগঞ্জ

খ) গাজীপুর

গ) ফরিদপুর

ঘ) চট্টগ্রাম

This question expects pupils to interpret by linking information across different parts of a persuasive text. About a third of the students (about 32%) have been unable to respond to this item correctly. Salma mentions that Babli will visit her towards the end of the text. She also mentions that Babli joined her school, which was in Manikganj in the early part of the text. These two facts need to be linked in order to understand that Babli was planning to visit Manikganj. Most of the pupils who responded to the item incorrectly (about 28% overall) chose Gajipur (Option B) as the answer. This suggests that pupils are unable to filter out irrelevant information.

8.2 Mathematics

Overall pupils of Grade 3 and Grade 5 are performing well in questions related to numbers and operations of whole numbers, shape and space. However, they find it challenging to solve word problems related to real life that expect the pupils to apply their conceptual learning. Teachers should support pupils to develop application and problem solving mathematical skills.

8.2.1 Example of mathematics questions

The students were asked to identify a number smaller than the given number (Grade 3).

নিচের কোন সংখ্যাটি ৫৪২৩ থেকে ছোট ?

ক) ৬৪২৩

খ) ৫৮৩২

গ) ৫৬৩২

ঘ) ৪৫২৩

This is the easiest questions and about 93 per cent of the pupils of Grade 3 were able to answer the item correctly (option D).

8.2.2 An example of a relatively difficult item from Grade 5

The students were expected to calculate the perimeter of the rectangular field where the word perimeter is not explicitly stated

একটি বিদ্যালয়ের মাঠের দৈর্ঘ্য ১৫০ মিটার, প্রস্থ ৭৫ মিটার। তুমি মাঠটির চারদিক এক বার ঘুরে আসলে মোট কত মিটার অতিক্রম করবে ?

ক) ২২৫ মিটার

খ) ৩৭৫ মিটার

গ) ৪৫০ মিটার

ঘ) ১১২৫০ মিটার

Nearly 21 per cent pupils were able to correctly answer the item (option C)

Over half (56 per cent) of pupils chose option D (area of the rectangular shape), suggesting that pupils have confused area with perimeter in the real life context.

Also, about 20 per cent of pupils chose option A. This shows that about a fifth of Grade 5 do not know the formula for either area or perimeter.

The analysis so far focused on statistical analysis of overall trends and patterns. This chapter aims to use a pedagogical approach to analyze what students understand and what they don't. This analysis is particularly relevant for the curriculum and textbook experts and teacher training experts. The statistical analyses so far covered will only identify who are the lower performing students and what are the associated background or environment factors, but they won't tell what exactly they know or what they misunderstand about. This chapter takes few examples of Bangla and Mathematics test which focus on the "mistakes" that students commonly made in NSA 2013 to reveal how wrongly students understood the concept or how they made mistakes though they understand the concept itself. The focus of the analysis is question items in which less than 75% of students have given correct answers [Category 1] and more than 25% of students have chosen one of the incorrect options [Category 2]. These test items are a great show in case of misunderstanding of students, and correcting these mistakes will have a direct impact on students' learning outcomes.[15]

Weakness in constructed response questions (CRQs) in math in both grades 3 and 5 implies twin weaknesses of math education in Bangladesh, which are:

- **Insufficient reading comprehension:** students often fail to grasp the situation described in the question sentence; and

[15]This section refrains from showing the actual test items due to confidentiality of test items for possible future use of the test items. Textbook, curriculum and teacher training experts should review an analysis of actual test items conducted separately.

- **Underdeveloped mathematical communication skills:** students are weak in writing mathematical sentences to express their ideas coherently and clearly.

While all the questions in NSA are neither challenging nor twisted, the analysis clearly shows that students in both Grades 3 and 5 are weak in solving constructed response questions (CRQs); in fact, all the CRQs fall in Category 1 above irrespective of content domains – i.e. in none of CRQs, more than 75 percent of students got right answers. This consistently exhibited weakness in CRQs alludes to the above mentioned two weaknesses of students' mathematical skills.

Improving language education is the most effective solution for improving the performance in math CRQs. As revealed by low performance in CRQs, students tend to have insufficient reading comprehension, and tend not to read sentences carefully till the end. Students often fail to grasp the situation described in the question. This is partly a language problem, and language education in Bangladesh should include training on "interpretation" of a text (e.g., thinking of the situation described in a story, discussing how the characters of a story feel in each scene, etc.), while it currently emphasizes reading given texts and writing words and sentences correctly. The pedagogical analysis of the NSA 2013 has not included Bangla subject yet, but a closer analysis of Bangla test will be needed for understanding students' skills in interpretation of textbooks.

Students often fail to construct the answers in a mathematical way as the current math education in Bangladesh simply focuses on "finding the answer". Mathematics education in Bangladesh needs to focus more on developing students' mathematical communication skills so that students can coherently and clearly communicate their thinking to teachers and their classmates by precisely using the language of mathematics. For example, there are several questions that require students to translate a wordily expressed problem into calculation. However, in both grades 3 and 5, relatively large proportions of students tend to fail placing values in the calculation and hence not reaching the right answer. It should be also noted that students' performance is especially weak when multiple steps are required to solve a problem because they are not well trained for logically sequencing multiple mathematical calculations to solve one problem.

Students have not acquired a number of basic knowledge due to lack of repetitive drills. NSA 2013 shows that many students don't understand the very basic concepts. For example, more than one third of grade 5 students fail to calculate a basic multiplication of an improper fraction by an integer. It is likely that students have not acquired the basic calculation skills on fractions, particularly the way to multiply fractions by fractions and integers. Part of the problem comes from insufficiency of repetitive drills. Teachers often make students recite what needs to be memorized. However this method does not help students memorize a new idea for long-term. While teachers provide some opportunities for students to solve a few questions in one lesson, repetitive drills are not used enough in classrooms to stabilize students' basic understanding. A new idea should be introduced through activities, in which such an idea is repeatedly used, rather than memorizing. This approach will need to be more emphasized during the teacher training and through school supervision.

Among subject domains, "measurement" is one of the weakest areas for both grades 3 and 5 students as students do not have practical experiences but are trained to memorize the unit conversion. NSA 2013 found that the percentage of correct answers in measurement domain was lowest among all subject domains for both grades 3 and 5 despite the fact that the most of the

measurement questions are simply testing the basic knowledge. Students easily get confused with conversions (such as kg to g) and often fail to read the scale, on questions related to length, weight, volume, and time. This is likely because lessons on measurement are too concentrated on a set of memorization, conversion, and calculation based on textbook exercises. On the other hand, current lessons often fail to provide actual experience of measuring length, weight, volume, and time using measurement tools. This transition of the approach will require changes in the textbook and teacher training.

Chapter 9

Key Findings & Recommendations

9.1 Conclusions and Way Forward

Internationally, the use of national assessment findings is not widespread, despite the potential that information derived from an assessment has for sparking reform and despite the expense incurred in obtaining such information (Kellaghan et al. 2009). There are two important ways of using findings of the national learning assessment, including (i) describing the state of educational quality and student achievement, and (ii) use of the information to address deficiencies identified in the assessment.

The first purpose is partly served by this report although there is a potential for much more detailed analyses. The report reviewed score distribution by different school characteristics, teacher characteristics, and student and household characteristics. It also covered pedagogical analysis of math test. While implementers often feel a sense of completeness when analysis for understanding the state of student's learning is finished, diagnosing is only one part of the purpose of NSA, and a purpose of taking remedial actions identified issues also needs to be fulfilled.

DPE was effective in disseminating the results of NSA 2011. A brochure was prepared and important findings and practical messages were disseminated not only to policy makers and administrators, but also teachers and communities. For NSA 2013, it is important that the DPE take more advantage of two years of solid learning assessment. There are five general areas of such information usage, which are: (a) formulating general policy and assisting in decision making in conjunction with other information, (b) setting standards, (c) providing additional resources to schools (system-wide or targeted), (d) supporting curriculum revision, and (e) revising textbooks or curriculum.

9.2 Policy Implications

Improving the quality of learning at early grades (Classes 1-3) is important because of still insufficient share of students mastering competencies in Bangla and Mathematics at grade 3. The result of NSA shows that considerable proportions of students are already falling behind by the end of grade 3. Although this proportion has improved substantially since NSA 2011, it should be noted that dropout students are not included in the sample, and it is likely that students' dropout is also linked to insufficient comprehension of lessons and lower motivation. In order to prevent increasing learning inequalities at upper grades and dropout of students, it is important to improve the quality of teaching and learning at early grades. Comprehension of very basic curriculum contents is critical for achieving upper level competencies at upper grades.

9.2.1 Identify and target low-performing schools

The result shows that variances among schools is larger than variances among students. This means there is a wide performance gap between well-performing schools and poorly performing schools. In order to reduce gaps and to increase the average learning, it is necessary to identify poor performing schools. The NSA data is collected on a sample-basis, so the government needs to develop a way to identify poorly performing schools that did not participate in NSA.

9.2.2 Consider geographical variations and school types when targeting low-performing schools

It is apparent from the NSA results that average performance is different by divisions, urban-rural areas, and school types even when other factors are held constant. Therefore, when identifying low performing schools, the priority should be given to those areas and types of schools that are performing more weakly when other conditions are held constant. By school types, it is RNGPS which requires urgent interventions.

9.2.3 Teachers and school administrators need access to high quality professional learning

Opportunities for professional learning need to be available in a range of areas relevant to the work of schools. The analysis of NSA 2013 shows that school head teacher's leadership and engagement in school activities are linked to performance. Tehrefore, it is important that performance of head teachers in terms of school management and engagement skills need to be assessed and improved if it is falling insufficient. Teachers will need to get fully capable of delivering lessons with correct subject knowledge. Teachers are reporting that they use materials and group work very often, but it is important for them to understand why they use those materials, rather than using materials because they are told to do so.

9.3 Way forward

The analysis of NSA identified many issues and areas for improvement. There are very minor reforms that the system can adopt immediately while there are also reforms that require enormous efforts to achieve. To sort these out, reform actions are classified into short-term, medium-term, and long-term. Short-term actions do not require large systemic changes, and they can be implemented fairly easily. Medium-term actions require some policy or minor systemic changes. They are meant for the period before the next round of NSA. Long term actions requires systemic changes and therefore may be implemented beyond next round of NSA.

9.3.1 Short-term Actions

Discuss among key stakeholders the priority for improving the quality of learning in primary education Bangladesh. The first important step is to discuss the results among key stakeholders, including not only the central government, but also division and upazila educational offices, teachers, NGOs, private schools, development partners, etc. All key stakeholders need to understand the strength and weakness of primary education system today. Discussions should be led to determine the priority actions for reforms.

Identify actions that teachers can start doing immediately in their daily practices. Teachers' roles are important because they are interacting with students every day. The analysis has shown that there are certain characteristics of students that are associated with students' learning – namely repetition and absence. It is important that all teachers and school administrators understand that students who have repeated and who are frequently absent, irrespective of reasons, are important signs of weak understanding of students. Schools and teachers should provide extra support to those students immediately. These actions do not require new massive training, but informing teachers

and school headmasters about the fact and encourage them to pay attention (by using brochures, for example) may be sufficient to start with.Similarly, teachers should start paying attention to outcomes of their pedagogical practices.

9.3.2 Medium-term Actions

9.3.2.1 Develop targeted interventions to the neediest schools

The NSA results show that there areconsiderable variances in performances among schools rather than among students. It is important and efficient at this stage to develop interventions that are targeted to the neediest schools. This action will include a scheme of identifying most needy schools and activities to improve learning quality. It is important to develop a scheme for identifying needy schools because the NSA 2011 is a sample survey, so it is only a representation of a bigger system. Low performing schools in the sample is merely representing a number of other low performing schools in the country.

9.3.2.2 Consider an equitable teacher management and deployment policy

One of the key findings from the analysis of NSA 2011 is different teacher profile between GPS and RNGPS which is likely to have led a performance difference between these two types of schools. As the difference in teacher qualifications between GPS and RNGPS show, resource allocation (as derived from teacher salary) is not equitable across schools. While this may require a longer term vision, a process should be started to build an equitable teacher and resource allocation policy. It can first start with some remedial actions (to fill teacher shortages for a short period) and continue with more system-wide redistribution of good teachers to needy schools.

9.3.2.3 It may be useful to develop a forum of teachers and educational staff to learn from each other across different schools and different regions

As results of NSA show, there are obvious regional differences in terms of students' performance and resource management. If some regions (upzailas/divisions) are performing well, other regions in the country can learn from lessons in the well performing areas. Exchange of staff and learning tours among different divisions and upazilas can foster knowledge transfer across different geographical areas.

9.3.3 Long-term Actions

9.3.3.1 Use the NSA result for aligning the learning goals by reviewing curriculum and textbooks

It is important that NSA measures performance against curriculum or learning standards, and NSA 2011 and 2013 have effectively done so. A forthcoming challenge is how to use the knowledge generated from NSA to improve the curriculum and textbooks. NCTB is currently developing new curricula for primary and secondary education. It is very important that the new curriculum for primary education addresses the weakness and strength identified in the NSA. Although a detail was not discussed in this report, NSA has a potential to identify strong and weak cognitive domains and cognitive skills. Ongoing curriculum reform should take advantage of such evidence and take it into consideration.

9.3.3.2 Develop an institutional home of learning assessment for regular quality monitoring

International experiences have shown that developing an institutionalized system of national learning assessment is not a trivial work. As the NSA team has experienced, the work is highly technical requiring skills of developing test items that are competency-based, comparable across different years and grade, and skills of sampling and analyzing the results. Therefore, it is important to build sustainable expertise in Bangladesh for undertaking system-wide learning assessment, including primary and any relevant upper levels of education. Institutional home of learning assessment is often debatable in many countries. Some countries try to establish an independent assessment body outside the ministry of education. In Sri Lanka, such a center is established within a University of Colombo. On the other hand, ministry of education is the main implementers of such assessment in some countries, including Chile and Uruguay, for example. In Uganda, National Examinations Board is the implementer of a national learning assessment. It is important also for Bangladesh to think what the sustainable and quality assured system for implementing NSA is for regular quality monitoring.

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