Bihar Elementary School Study

May 2014

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Evidence for Action

Bihar Elementary School Study

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Contents

In the last few years, a number of large scale assessments (LSA) on student learning outcomes have been conducted in states as well as at national level. Usually, these LSAs are graded-school based assessments targeted at specific grades. Although assessment frameworks, measures and methods vary considerably across these large scale studies, overall the findings of all seem to agree that learning outcomes across grades and across subjects are far from satisfactory. Based on the accumulating evidence, it is imperative that serious action is taken to improve children's learning levels in India.

For the most part, the student achievement studies have been treated as research studies and have not at least directly led to action. Perhaps that is partly due to the fact that such studies are designed and data is analyzed by "experts". One of the major objective of the "Bihar Elementary School Study" was not only to understand children's learning levels but also to build capacities of key people at district level in the state of Bihar. Key government officials at the state level and district level were engaged in this unique initiative, right from the early stages of the project. State level officials from the education department and SCERT, along with UNICEF, participated in the conception and design of the project process, as well as provided support. At the district level, DIET faculty, and Cluster Resource Centre Coordinators along with ASER/Pratham team members were responsible for training DIET students and implementing the survey and the assessments. We hope that the combination of capacity building efforts as well as the analysis and understanding of the actual findings/data from the study will enable districts to improve learning levels of children.

The Bihar Elementary School Study assessed students of Std 2, 4 and 6 of randomly selected clusters in all districts of the state in May 2014. 1047 schools, 62540 children from 79 cluster participated in the study. This document outlines the major components of the effort.

Over the last few years, Bihar Government has made efforts to improve the quality of teaching-learning in schools across the state. "Mission Gunwatta" is one such intervention that was rolled out in all government elementary schools during the academic year 2013-14. Among others, three key features of "Mission Gunwatta" were the following:

- Specific teachers in each school were assigned to work with Std 1 and 2

- Special training given to teachers of Std 1 and 2

- For several hours during the school day, children of Std 3-5 were taught by level rather than by grade with reading and basic arithmetic as the focus of this special effort

In addition, there has been an effort to provide report cards for students & teachers, monitoring checklists to cluster coordinators, teaching guides (learning facilitation manual) to all teachers. These are all efforts aimed at improving quality in elementary education.

In April 2014, Bihar Government invited ASER Centre/Pratham to do a school based assessment of children's learning[1]. The objective was to have an end of year school based assessment that could help in understanding what the state had been able to achieve in 2013-14 and also to use evidence to plan for the following school year.

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[1] ASER Centre is the assessment, survey, evaluation and research unit of Pratham (see http://www.asercentre.org). Pratham Education Foundation is a non-government organization that works in many states across India, directly with communities and schools and also with governments to ensure that every child is in school and learning well (see http://www.pratham.org)

Conducted in May 2014, the "Bihar Elementary School Assessment Study" was a joint effort of ASER Centre/Pratham & SCERT (Bihar Government) and UNICEF. The objectives of the "Bihar Elementary School Study" included:

- Generating data for academic achievement of students who were enrolled in Std 2, 4 and 6 in the 2013-14 school year.

- Developing cluster level report cards of children's learning that could guide CRCCs in improving teaching-learning in the schools in their charge.

- Building capacity at district level for conducting large scale assessments of student learning and for using evidence for action.

The study was carried out in all 38 districts of Bihar. In the initial meetings between senior officials of the state government and ASER Centre/Pratham, a decision was taken to sample by clusters. For each district, clusters were randomly selected and all schools in the cluster were surveyed. A total of 1047 schools (616 primary & 431 upper-primary schools) participated in the study. Students in these schools who had been in Std 2, 4 & 6 were tested in language (Hindi) and math.

Students who were enrolled in Std 2, 4 and 6 (of academic year 2013-14) were assessed in language & math for this study. The assessment was carried out in May 2014, the last week just before schools closed for summer vacations. Two types of assessments were administered – a basic assessment of reading which was done one-on-one with all children in the study as well as a pen-paper test in language and math that was administered to the entire class. For Std 4, a one-on-one math assessment was also conducted.

Language and Math

One on one assessment **Pen-paper assessment**
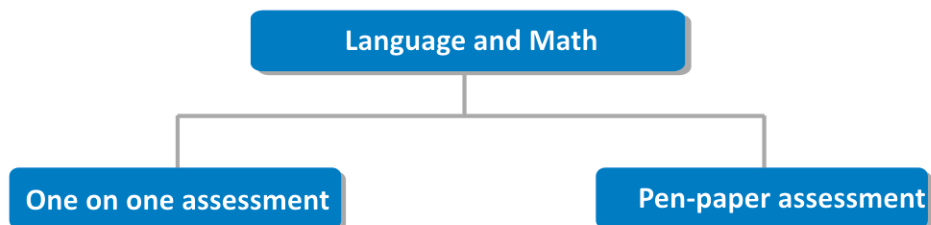
The one-on-one assessment of basic reading used the ASER reading test for all grades. Students of Std 4 and 6 were also given pen-paper tests in language and maths. The pen-paper tools for Std 4 and 5 were developed by ASER Centre/Pratham in collaboration with the SCERT. For each tool there were two test-forms/samples. Std 2 students were tested one-on-one, in basic reading and math only. The highest or most difficult task was at Std 2 level.   The highest level that the child could comfortably reach was recorded.

Given below is a table that explains the type of test each grade were tested for.

TABLE 1				
Std	**Pen and Paper Testing (Written)**		**One on One Testing (Oral)**	
	Language	**Math**	**Reading**	**Numeracy**
2	x	x	✓	✓
3	✓	✓	✓	✓
4	✓	✓	✓	x

In the initial meetings of Bihar government and ASER Centre/Pratham when the design of the study was being discussed, it had been decided that for each district sampling would be done by clusters. Given the time frame and manpower resources that were available, 2-3 clusters were randomly sampled using PPS (Probability Proportional to Size)[2] methodology. The aim was to conduct the assessment in all government schools in the cluster that had primary or upper primary sections. A total of 25-30 schools for each district were covered in the study. If the sampled cluster had 25 or more schools, then only one cluster was covered in those districts. A total of 1047 schools were surveyed as part of this study.

Three grades were chosen for the study – Std 2, 4 and 6. All children present on the day of the visit in the respective schools were given the written test. All children who had been given the written test were also assessed one-on-one for reading (and math for Std 4).

All 38 districts participated in the assessment. Government schools with Urdu medium of instruction were not included in the assessment as the appropriate tools were not available in Urdu at the time.

Table 2: Number of students tested				
Std	**Pen and Paper Testing (Written)**		**One on One Testing (Oral)**	
	Language	**Math**	**Reading**	**Numeracy**
2	Std 2 children were not given any written test		22,425	22,425
3	22,467	22,465	22,467	22,465
2	17,648	17,640	17,646	Std 6 children not given this test
4	40,115	40,105	62,538	44,890

[2]PPS is a sampling method in which the probability of selecting a sampling unit is proportional to the size of its population. It gives a probability (i.e. random, representative) sample

6 Assessment framework

The assessment framework that was developed had three main elements as part of the design:

(a)   Basic skills like reading, number knowledge and operations were included. This was done for the early grades as well as for Std 6. This was because part of the quality interventions that Bihar government had initiated was based on building these basic skills. Hence a measurement and benchmarking of these basic skills was needed.

(b)   In addition to basic skills (like reading, number knowledge and operations), it was also decided that higher order skills like vocabulary, comprehension, problem solving and applied knowledge should also be explored. These higher skills are part of the National and Bihar curriculum frameworks.

(b)   Given the constraints of time and resources, it was decided that the assessments for May 2014 would only include language and math.

There were another set of considerations that went into the design of the assessment framework, as follows:

(a)   Available evidence like ASER indicated that many children even in Std 6 had difficulty in reading fluently. Hence a one-on-one assessment of reading was also included. If a child cannot read fluently, it is likely that s/he will not be able to cope adequately with a pen and paper test.

(b)   Available evidence from previous pen-paper tests also suggested that a significant proportion of children were not at grade level. Hence the test items were designed to have basic and simple items as well as tasks that were up to at least one grade level below the grade of the child being assessed.

(b)   Based on these considerations, two assessments were administered, the first one was a written test, with both multiple choice & open-ended items, and the second test was a one-on-one/oral test.

6.1. Written assessment framework

The main objective of the language and math written assessments was to understand how far children have reached. So it was important to map students' learning outcomes not only to their current grade competencies, but also to the previous grades. For example, in the Std 6 written test-paper there were questions/competencies from Std 3, 4 and 5. Such methodology not only allowed us to know whether students are able to do tasks at these levels, but also helped us to understand where children will need more support and strengthening. Data from such assessments can provide important inputs for teacher training, curriculum and material development and for planning the course of action at the school and cluster level.

As part of the assessment development process, thorough analysis of textbooks and other related documents were done. The documents that were referred and analysed as a part of this process are the Bihar state textbooks, National Curriculum Framework, NCERT Learning Indicators (class wise), NCERT sourcebook on Assessment. Data available from previous research studies done by ASER Centre were also analysed.

For each of the written assessment tools, 2 test-forms were created. These test-forms for a particular subject & grade are equivalent[3] in nature, since it is drawn from the same "table of specifications". Also, the items under specific competencies in each test-form generate similar results when comparisons on their difficulty-level are made. The number of competencies tested and question items are also the same for each test-form.

When the written tests are distributed to the students, alternate test-forms are given to ensure minimum "copying & cheating" amongst students. In addition to this, the seating arrangement is done in such a manner that only 2 to 3 students are seated in a row (as far as possible). It was also compulsory to have 2 evaluators during any given point of time when the written assessments were conducted for a particular grade.

The distribution of questions according to the competencies covered in the language written-test paper for Std 4 and 6 are as follows:

Table 3. Std 4 (Language)		
Competency		Number of items
Vocabulary	Std 1 level words	2
	Std 2 Level words	3
	Std 3 Level words	3
Reading comprehension (familiar narrative text based on passages from Bihar textbook)	Direct retrieval questions	2
Reading comprehension (One narrative text)	Direct retrieval questions	2
	Integrate questions	1
	Interpret questions	1
	Synthesis question	1
Total number of items		15

Table 4. Std 6 (Language)		
Competency		Number of items
Vocabulary	Std 3 level words	2
	Std 4 Level words	3
	Std 5 Level words	3
Reading comprehension (One narrative text)	Direct retrieval questions	1
	Indirect retrieval questions	1
	Integrate questions	1
	Interpret questions	1
	Analyse question	1
	Reflect question	1
Reading comprehension (familiar narrative text based on passages from Bihar textbook)	Std 3 level words	1
	Std 4 Level words	1
	Interpret questions	1
	Reflect question	1
Total number of items		18

The distribution of questions according to the competencies covered in the math written-test paper for Std 4 and 6 are as follows:

Table5. Std 4 (Math)		
Competency		**Number of items**
Number Recognition	1 digit	1
	2 digit	1
	3 digit	1
	4 digit	1
Number Comparison	2 digit	2
	4 digit	2
Number Operation	Addition (2 by 2 without carryover)	1
	Addition (2 by 2 with carryover)	1
	Subtraction (2 by 2 with borrow)	1
	Multiplication (2 by 1)	1
	Division (2 by 1 without remainder)	1
Shapes & Geometry	Identifying shapes	3
Word Problems	Addition (1 by 1)	1
	Subtraction (2 by 2)	1
	Multiplication (2 by 2)	1
	Division (2 by 1 without remainder)	1
Everyday Math (Time)	Reading time from a clock	2
	Calendar related question	2
Everyday Math (Money)	Computing costs from a list	2
Competency		**26**

Table 6. Std 6 (Math)		
Competency		**Number of items**
Number Recognition	1 digit	1
	2 digit	1
	Fractions (comprehension from diagrams)	2
Number Comparison	2 digit	1
	3 digit	1
	4 digit	2
	Integers represented on number line	1
	Fraction (Same & Different denominator)	2
	Fraction (Mixed)	1
Number Operation	Addition of whole nos. (2 by 2 w/o carryover)	1
	Addition of whole nos. (2 by 2 with carryover)	1
	Subtraction of whole nos. (2 by 2 with borrow)	2
	Subtraction of whole nos. (4 by 4 w/o borrow)	1
	Multiplication of whole nos. (3 by 2)	1
	Division of whole nos. (3 by 1 w/o remainder)	1
	Division of whole nos.(3 by 1 with remainder)	1
	Addition of fractions (same denominator)	1
	BODMAS	1
	Subtraction of fractions (different denominator)	1
	Subtraction of decimals	1
Shapes & Geometry	Types of triangles	2
	Angles (properties of triangle)	1
	Area of a rectangle	1
	Perimeter of a rectangle	1
	Extension to the perimeter question	1
Word Problems	Addition (3 by 3)	1
	Subtraction (3 by 3)	1
	Multiplication (2 by 2)	1
	Division (3 by 1)	1
Everyday Math (Time)	Reading time from a clock	2
	Calculation of time	1
	Calendar related question	2
Everyday Math (Money)	Computing costs from a rate menu	2
Data Handling	Pictograph	2
	Data Table - Questions using addition & multiplication	4
Total number of items		**47**

The written test is a combination of multiple choice questions and open-ended questions. Given below is the break-up of the type of questions, grade wise & subject wise.

Table 7. Type of questions			
Subject	**Type of items**	**Std 4**	**Std 6**
Language	Multiple Choice Questions	15	15
	Open-ended Questions	0	3
Total number of question items		**15**	**18**
Math	Multiple Choice Questions	7	9
	Open-ended Questions	14	32
Total number of question items		**21**	**41**

6.2.One-on-one/oral assessment framework

One-on-one assessments are needed for children who are as yet not able to read. Relying solely on pen-paper written tests is not appropriate for such children. So students were assessed one on one, orally using a simple set of items for reading, number knowledge and operations. This one-on-one /oral assessment is very similar to the assessment of the annual national study, ASER[4], where children are marked according to their highest level of competence.

The one-on-one oral reading test has the following 4 items:

Table 8. One-on-one/oral test (Language)	
Level /Competency	**Description of the competency**
Reading a Std 2 level text (Story)	A short fictional passage written in the form of a story; it has a total of 8 to 10 sentences and 55 to 60 words. The level of difficulty for the story is a Std 2 level text (words and expressions used).
Reading a Std 1 level text (Paragraph)	A set of four sentences (connected text of Std 1 level difficulty). It has a total of 4 sentences, with 18 to 20 words.
Word	A list of 10 words. These are commonly used words in daily life. Each word will either have 2 alphabets with 2 matras or 2 alphabets with 1 matra
Alphabets	A list of 10 alphabets.

The oral numeracy test has the following 4 items:

Table 9. One-on-one /oral test (Math)	
Level /Competency	**Description of the competency**
Number Operation: Subtraction (Std 2 level)	2 by 2 subtraction with borrowing
Number Operation: Addition (Std 1 level)	2 by 2 addition without carry over
Number Recognition (10-99)	A list of 10-two digit numbers (from 10 to 99)
Number Recognition (1-9)	A list of 8-one digit number (from 1 to 9)

The written assessments had 2 types of questions, multiple choice and open-ended questions or questions where the child solves the question and gives her answer. Given below is the scoring rubric both for the MCQ (multiple choice question) items as well as open-ended items.

Multiple choice questions: For each MCQ, the response chosen by the child will be entered. The following codes are assigned:

Table 10. Scoring rubric – MCQ Items	
Scoring Code	**Description of the competency**
0	Have not selected any option
1	Selected option (A)
2	Selected option (B)
3	Selected option (C.)
4	Selected option (D)
5	Selected Option (E) which is "I do not know the answer"
8	Selected more than 1 option (can be a ü or any other marking)
9	Selected a response but has not put a ✓ (or any other marking) in the box that was given or ✓ elsewhere on the question

Table 11. Scoring rubric – open-ended Items	
Scoring Code	**Description of the Code**
0	Not attempted
1	If the answer is incorrect
2	If the answer is correct

Multiple choice questions:

- Instead of ticking an option, if a child has used any other marking in the box then consider that as an option

- If the grader has left the grading box blank then it will be marked as '7'.

- If a grader has marked in two places it will be marked with a code of '8'.

- If the grader has marked outside the box, it will be marked as '9'.

One of the main objectives of this exercise was to involve government teams at all levels in an integral way in all aspects of the assessment. Thus, the responsibility of the "Bihar Elementary School Study" for each district was handed over to a team consisting of DIET, BRCCs and CRCCs members. In addition to this, members of Pratham/ASER Centre were also part of the district teams to help in conducting the assessment. Effectively, every district was lead by a team of 5 Master Trainers, 2 government officials (DIET faculty or district level officer) and 3 Pratham/ASER Centre members.

A state level-residential training workshop for the Master Trainers (MTs) was organised at the SCERT campus in Mehendroo in Patna, Bihar. Approximately 200 people were trained for 5 days. There were 4 batches running simultaneously during this time. The training was conducted by Pratham/ASER Centre trainers. The training had classroom lectures and field practice sessions. The field practice day is a very important part of the training process in which all aspects of the assessment is "practiced" in detail. As part of this field practice, 24 government primary and upper primary schools were visited in and around Patna city by the 200 participants in the workshop.

The state level training had two main objectives. The first one was to prepare strong district teams, who would lead the study in their respective districts. Secondly, and the more crucial part of the training was

to help the government officials to build their capacities to understand about the nuts & bolts of large scale assessments (LSA), and how to interpret data/findings of an evaluation and use it for better planning to improve learning outcomes.

The 1st half of the first day of training therefore focussed on understanding about LSA and important issues to keep in mind while developing and implementing LSA. In the remaining days of the training, the MTs were trained thoroughly on how to administer the written and oral assessments. MTs were encouraged to work and understand through activities based learning and group activities. They were asked to prepare in groups for mock presentations on how to administer the assessments. The MTs were also trained on how to score the response of the students, so that they have a complete idea of all the important components of an evaluation.

A state level residential-training was conducted in the 1st week of May where 200 people participated. Given below is the schedule of the 4 day long residential-training, with one day of field practice.

Table 12: Schedule - State level training				
Timing	**Day 1**	**Day 2**	**Day 3**	**Day 4**
9:30 to 10:00		Session on Administration of the Written Assessment Tools	**Practice in the field (for both school indicators and testing of children)** 6:30 AM to 12 AM	Mock Training – To understand how well each participant has understood all the processes of testing
10:00 to 11:00	Introduction about Bihar Assessment - A power-point presentation			
11:00 to 11:15	**Tea Break**	**Tea Break**		
11:15 to 12:00	Understanding the Process of Large Scale Learning Assessments – A power-point presentation (distribute handouts)	Continuation of the Session on Administration of the Written Assessment Tools		
12:00 to 13:00	Session on Assessment Tools and Formats - Getting to know the school, getting to know children, oral-one-on-one tools, school indicators	• Session on "How to Conduct a Training Programme" - Handout on good training practices • Session on Monitoring - Handout (Guidelines), Case studies and Formats	Watching Election Results	District Level Planning: Planning format to be filled for every district
13:00 to 14:00				
14:00 to 15:00	**Lunch**	**Lunch**	**Lunch**	**Lunch**
15:00 to 16:00	Continuation of the session on Assessment Tools and Formats	Continuation of the session on Monitoring • Quiz of all participants • Guidelines for Field Visit	Session on Grading of the Written Assessment Tool	ASER and Pratham team to conduct their internal planning for district survey
16:00 to 17:00				
17:00 to 18:00				

Similar trainings were conducted in all districts of the state. These were led by the five MTs for the district. In districts where there were DIETs, 60 students participated and became the evaluators/surveyors for this exercise. In districts where there were no DIETs or if the DIETs did not have adequate number of students, CRCCs joined the exercise. At the district level, DIET students/CRCCs were trained for 4 days including one day of field practice. This is the team that was responsible of going to schools and conducting the assessments. MTs accompanied the field teams every day during the data collection period.

The first half of each of the data collection days was spent by the surveyors/evaluators and MTs in their assigned schools. The second half of the day was spent by the entire team in grading papers under the supervision of the MTs. This way within a week all data collection and grading was completed. By the end of the week, the Master Trainers returned to Patna (to the SCERT) to hand over all the completed and graded answer sheets and other assessment documents.

To attain high data-quality, a comprehensive monitoring and recheck process was adopted. The assessments in one school were done across a period of maximum 4 days. On the first day, information was collected on various school indicators and one-on-one/oral testing of Std 2 was conducted. On the following second and third day, students of Std 4 and/or 6 were given the written assessments for both language and math respectively. On the fourth and last day, students of Std 4 and/or 6 were orally tested. In every district, the data collection work for the assessment was completed over a span of 3 to 5 days. On an average the district MTs-team were able to monitor 10 to 12 schools. All MTs were in the field with the survey teams for each and every day of the data collection process.

In addition to the regular monitoring, a recheck model was also put in place. This recheck process had three parts. The first one was implemented by the team of MTs during the survey period. Once that is successfully completed, one round of recheck is done at the data entry level before the data entry and a final one after the data entry for one school is completed.

The following desk-recheck guidelines were given to the Master Trainers:

- Matching final compilation numbers on "Daily Compilation Sheet" with actual number of Std 2, 4 and 6 students tested.

- Checking if the school name and school code is correct.

- Checking if certain sections of the questionnaire are filled up completely and correctly, for example enrollment & attendance figure, mother's name filled for each child, checking if learning levels are marked for each child on the "oral test sheet"

- Check if the evaluators are scoring the papers correctly according to the answer sheet and grading rules discussed. Randomly select 10 papers and check scoring for all non-MCQ questions.

- If 4 or more (out of 10 papers) have even 1 scoring error, then orient the respective evaluator on scoring. Also the evaluator is asked to re-score all the papers.

The following are the recheck guidelines to be implemented at the data entry level, before data-entry starts:

- Match the material received for each district with the Material Submission Sheet for that particular district. Ensure that all material that is mentioned has been received at the data entry centre.

- School code and school name is correct. The School Code written on each written tool should be same.

- Match the name on the hardcopy with the school list in the database.

- Ensure that there is no duplication of child IDs.

- Ensure that each child in Std 4 has been given a unique Child ID.

- For each student check that Child ID written on Language and Math tool is same.

- Ensure that each child in Std 6 has been given a unique Child ID.

Following are the guidelines for recheck after the data entry of a school is finished.

- Level 1 – A check to ensure whether data for all schools and all children that was received has been entered (matching School codes and Child IDs)

- Level 2 – 10% of the data from each class (2, 4 and 6) will be rechecked (matching the data that is entered with the hardcopies). For Std 4 and 6 data for both Language and Math tools will be rechecked. This recheck will be carried out as and when the data from a district is entered.

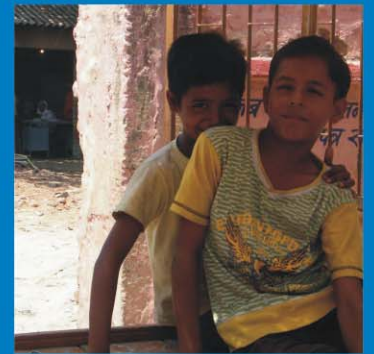- Level 3 – Additional data entry recheck (similar to Level 2) can be done by ASER Team.

Bihar

School

Report

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